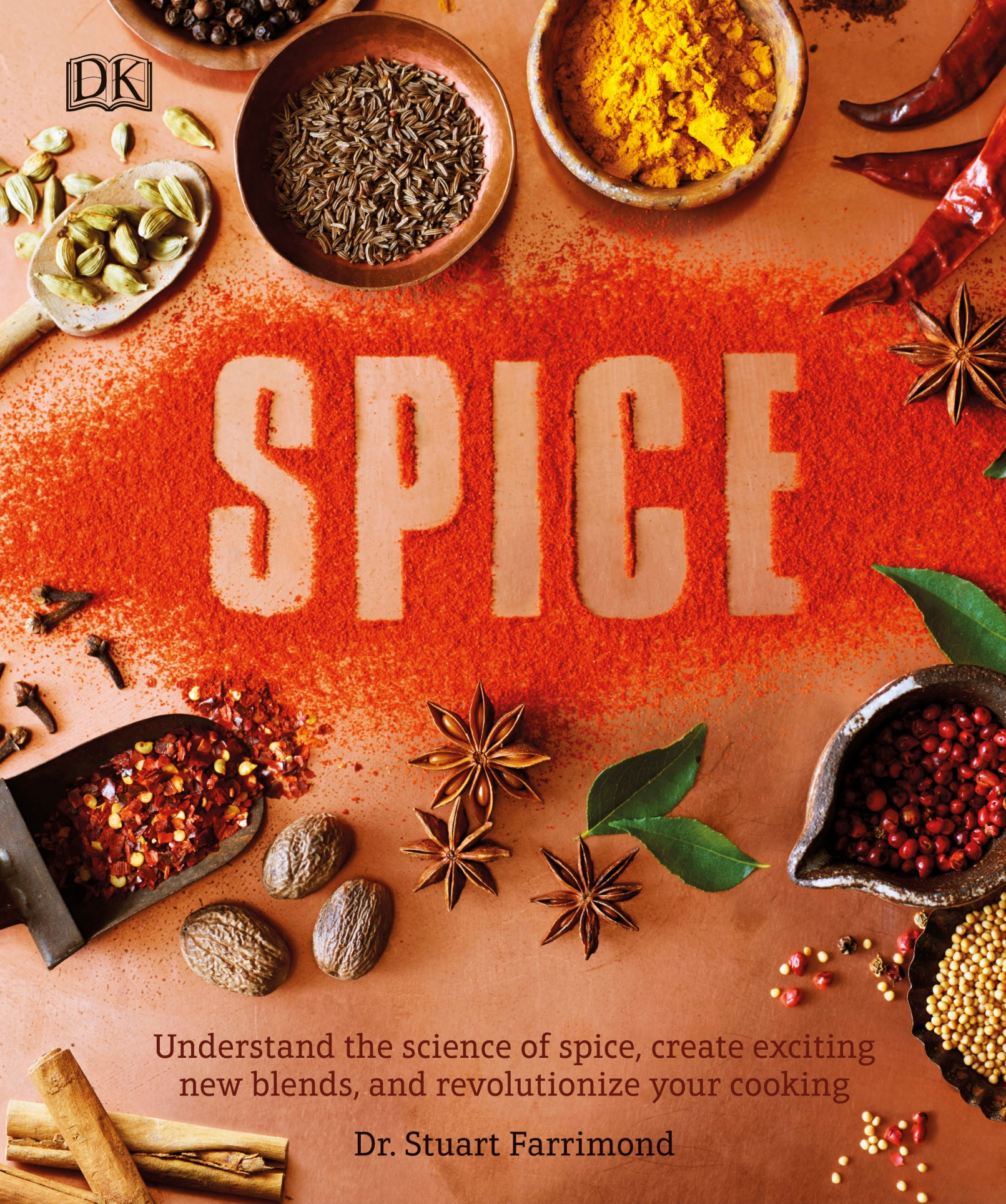
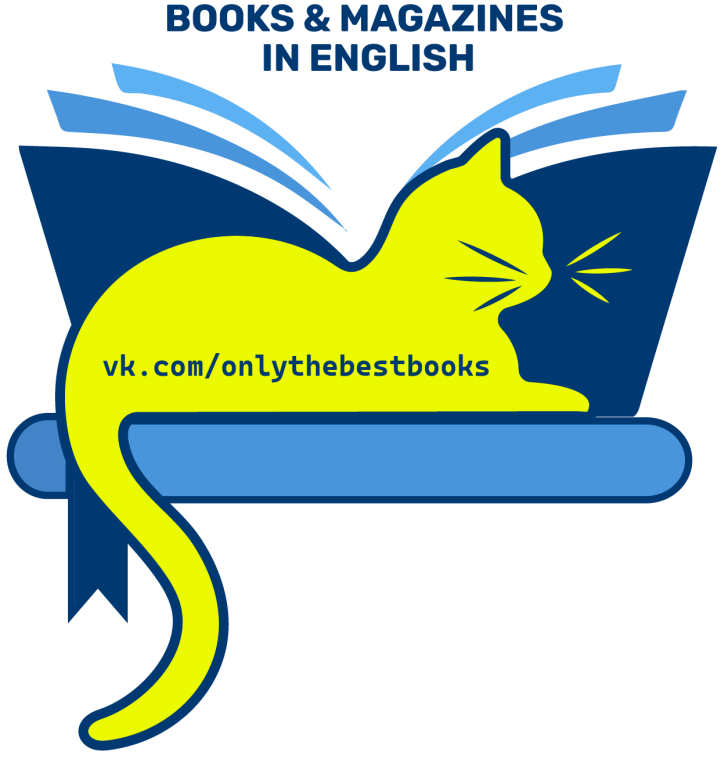


Understand the science of spice, create exciting new blends, and revolutionize your cooking

Dr. Stuart Farrimond


BOOKS & MAGAZINES
IN ENGLISH
vk.com/onlythebestbooks

SPICE

Understand the science of spice, create exciting new blends, and revolutionize your cooking

SPICE

Understand the science of spice, create exciting new blends, and revolutionize your cooking

Dr. Stuart Farrimond

DK

Senior Editor Alastair Laing
Senior Designers Saffron Stocker, Alison Gardner
US Editor Megan Douglass
Project Art Editor Louise Brigenshaw
Designers Simon Murrell, Mandy Earey
Jacket Designer Saffron Stocker
Jackets Coordinator Lucy Philpott
Producer (Pre-Production) Robert Dunn
Senior Producer Ché Creasey
Managing Editor Dawn Henderson
Managing Art Editor Marianne Markham
Art Director Maxine Pedliham
Publishing Director Mary-Clare Jerram

Jacket photographer Tara Fisher
Jacket food stylist Maud Eden
Recipe photographer Mowie Kay
Food styling Tamara Vos
Prop Styling Linda Berlin
Spice photographer Gary Ombler

DK Delhi
Senior Editor Janashree Singha
Assistant Editors Devangana Ojha, Tanya Singhal
Project Art Editor Vikas Sachdeva
Art Editor Roshni Kapur
Asst Art Editors Amrai Dua, Monam Nishat, Simran Saini

Managing Editor Soma B. Chowdhury
Senior Managing Art Editor Arunesh Talapatra
Production Manager Pankaj Sharma
Pre-production Manager Sunil Sharma
DTP Designers Nandkishor Acharya, Umesh Rawat, Vikram Singh

First American Edition, 2018
Published in the United States by DK Publishing
345 Hudson Street, New York, New York 10014

Copyright © 2018 Dorling Kindersley Limited
DK, a Division of Penguin Random House LLC

18 19 20 21 22 10 9 8 7 6 5 4 3 2 1
001–311075–Oct/2018

All rights reserved.
Without limiting the rights under the copyright reserved above, no part of this publication may be reproduced, stored in or introduced into a retrieval system, or transmitted, in any form, or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the prior written permission of the copyright owner.
Published in Great Britain by Dorling Kindersley Limited.

A catalog record for this book is available from the Library of Congress.
ISBN 978-1-4654-7557-2

Printed and bound in Malaysia.

All images © Dorling Kindersley Limited.
For further information see: www.dkimages.com

A WORLD OF IDEAS:
SEE ALL THERE IS TO KNOW
www.dk.com

CONTENTS

Foreword 6

SPICE SCIENCE **8**

What is a Spice? 10
Spices and their Flavor Compounds 12
Periodic Table of Spices 14
Creating Spice Pairings and Blends 16

WORLD OF SPICE **18**

Middle East 20
Africa 30
South Asia 38
Southeast Asia 46
East Asia 54
The Americas 62
Europe 70

SPICE PROFILES **78**

Sweet Warming Phenols 80
Warming Terpenes 102
Fragrant Terpenes 116
Earthy Terpenes 126
Penetrating Terpenes 130
Citrus Terpenes 142
Sweet-Sour Acids 148
Fruity Aldehydes 160
Toasty Pyrazines 164
Sulfurous Compounds 172
Pungent Compounds 180
Unique Compounds 194

RECIPES

Chinese Steamed Salmon with Chili and Star Anise 92
Chicken and Eggplant Biryani with Seven-Spice 104
Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
West African Peanut Curry with Durban Masala 124
Asian Larb Salad with Curried Duck and Khao Kua 140
Date and Tamarind Granita with Caramelized Pineapple 156
Black Sesame, Licorice, and Cardamom Ice Cream 170
Sweet and Spicy Apple Pastry Rosettes 182
Spiced Scallops with Saffron Beurre Blanc 196
Spiced Filipino Adobo with Chicken and Pork 208

World of Spice Further Recipes 210
Table of Spices and their Flavor Compounds 214
Index 218
About the Authors 223
Acknowledgments 224

FOREWORD

Many cooks are intimidated by spices. All too often, a pot of spice is bought for a recipe then pushed into the gloomy depths of a kitchen cupboard, where it remains untouched for many years. This should not be so, for spices are the lifeblood of countless dishes. Neglecting spices does a disservice to a cook's culinary talents. They not only enhance the natural flavors of a dish, but can bring new flavors and aromas to familiar foods, exciting all our senses. To cook without spices is like composing an orchestral opus without a string section; cooks who view spicing as a grind of black pepper or a spoon of curry powder need to embrace the richness that spices can offer.

This book is for cooks who want to experience new flavor combinations that will both excite and delight. Prescriptive recipes can frustrate the creative cook, but until recently, the only way to know which spices would blend together was by trial and error. Personal experience, tradition, and a sprinkle of intuition were the ingredients for making spice mixes. Not anymore, because scientific discoveries have turned old-fashioned ideas on their head. Spices can be blended and added to dishes that had not previously been considered, and no one should be shackled by recipes from chefs, internet "gurus," or family tradition. This book is the culmination of an ambitious, never-before-attempted project that aims to serve up some easy-to-follow, science-based principles that will hopefully transform the way you use spices in your cooking.

It is important that ancient wisdom is not cast aside, however. Centuries of cooking experience are the bedrock of every country's food heritage, and here you will explore the traditional range of spices used in key regions and countries around the world. A variety of top chefs who specialize in different regional cuisines have contributed some of their favorite spice mixes and recipes. Rather than starting from a blank canvas, you can use the spice blends as a foundation upon which new creations can be built. The recipes showcase some of these blends, and also suggest using innovative spice combinations to add a tantalizing twist to familiar dishes.

Whether you're an experienced cook or a complete beginner, I hope that you will be inspired and empowered to unleash your culinary talents. Add a sprinkle of flavor science or ladle in dollop-loads; let this guide open up a world of sensational new gastronomic delights. Never again will your spice jars languish in the dark!

Dr. Stuart Farrimond

“This book serves up easy-to-follow, science-based principles that will transform the way you use spices.”

SPICE | *science*

Understand the science behind how spices work, discover flavor compounds and flavor groups, and learn how to create inspired spice blends.

WHAT IS A SPICE?

Spices are plant parts that are more densely loaded with flavor than most other ingredients used in cooking. Whereas herbs always come from leafy parts, spices tend to derive from seeds, fruits, roots, stems, flowers, or bark, and are usually dried. That said, some strongly flavored leaves, such as bay and curry leaf, can be considered spices because they are used more as a potent background flavoring than as a fresh addition.

Chemical stores

Spices have been valued throughout history, in religious ceremonies and medicine as much as in cooking. Science has shown us that these once-mystical plant parts are in fact the vessels of chemicals known as flavor (or aroma) compounds, generated to help plants survive and reproduce, perfroming roles such as repelling animals or protecting against bacteria. By happy coincidence, many of these compounds have aromas that are pleasant to humans.

> *"Spice flavors are chemicals produced by plants, often for defence."*

STEMS

The stem of a plant distributes water and sugars to where they are needed. Few spices derive from stems: lemongrass is the stalk of a tropical grass and little-known mastic is the dried resin collected from lentisk trees; more famously, cinnamon and cassia are dried pieces of inner and outer bark, respectively, of *Cinnamomum* trees.

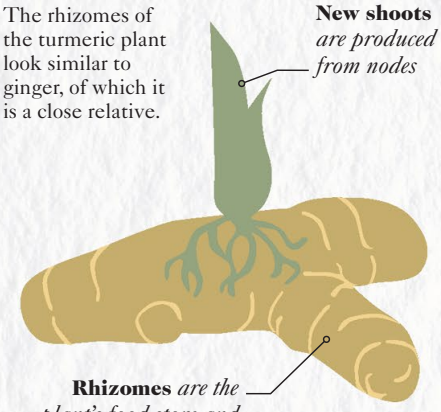
Cinnamon
New shoots of coppiced trees are stripped for their inner bark to produce cinnamon.

Communication
The spicy, woody aroma of cinnamon comes from a chemical compound called caryophyllene. When a plant is being eaten, its role is to act as an airborne signal that "primes" downwind plants to produce defensive chemicals.

ROOTS AND UNDERGROUND STORES

Roots are a plant's lifeline to water and nutrients, and rhizomes, corms, and bulbs are storage chambers with the ability to produce new shoots and roots. Licorice comes from dried roots and asafetida is derived from dried root sap. Turmeric, ginger, galangal, and garlic are all examples of underground stores.

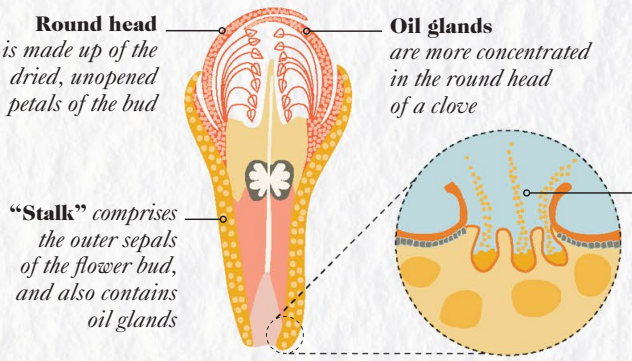
Turmeric
The rhizomes of the turmeric plant look similar to ginger, of which it is a close relative.



Animal deterrent
Turmeric's flavor profile includes a powerful compound called cineole, which has a strong, penetrating, slightly medicinal flavor and has evolved to act as a bitter-tasting deterrent to animals who try to eat the rhizomes.

Flavor stores

The vast majority of flavor compounds in spices are oil- rather than water-soluble and are stored within bubbles of oil. Spices are structured to keep these oils locked away, to be released only if the plant is damaged or attacked by infection. Once the bubbles rupture and the oil is exposed to air, the flavor compounds quickly evaporate into gases.



Cross section of a clove

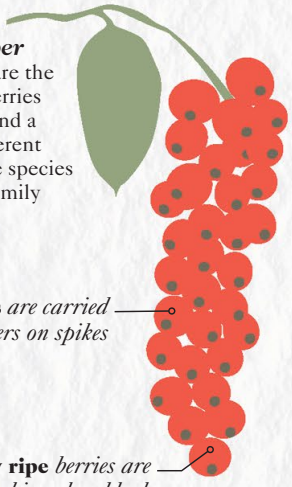
Cloves are rich in highly flavored oils, stored in oil glands just beneath the surface of both the rounded top of the bud and the "stalk."

FRUITS

The seeds of flowering plants are contained in fruits. Many have evolved to be sugar-rich so they make an appealing meal for animals, who thereby distribute the seeds over a wide area. Numerous spices are derived from fruits, including allspice, sumac, vanilla, and chilis. Several "seed" spices are technically fruits, including dill and ajwain.

Black pepper

Peppercorns are the small dried berries of one of around a thousand different flowering vine species in the plant family *Piperaceae.*



Insect repellent

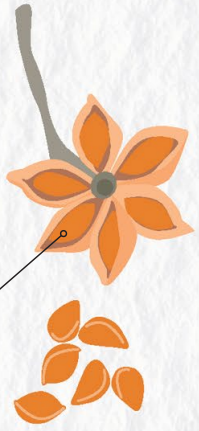
The heat from pepper is produced by a chemical called piperine which, as well as irritating hot pain nerves on the tongue, is highly repellent to insects and has been harnessed by the chemical industry as an insecticide.

SEEDS

The majority of spices are seeds; think of cumin, cardamom, mustard, and fenugreek, or less obviously nutmeg, which is a seed kernel. It is little wonder that plants frequently concentrate their strongest-tasting defensive chemicals in seeds, since these are the precious packets of new life that will sprout into the next generation of plants.

Star anise

The seeds of this strikingly shaped spice are contained within a woody protective covering, called a carpel, where much of the flavor is in fact concentrated.



Health protection

Star anise's dominant flavor comes from anethole, a substance that appears to have evolved to fight off infections and repel insects, and which incidentally has an appealing taste—13 times sweeter than sugar—to the animal tongue.

FLOWERS

Many flowers are known for their attractive aromas, which have evolved to entice insects into paying a visit and pollinating the flower as they do so. Only a few have strong enough appealing flavors to be considered a spice, most famously saffron, whose red strands are pollen-receiving female sex parts (stigmas) of a crocus flower. Another notable flower spice, it may be surprising to discover, is clove.

Clove

The nail-shaped, dark brown clove are neither a seed nor a dried fruit, but the dried flower bud of an evergreen tree from Indonesia.

Pollinator attraction

Clove contains a high concentration of eugenol, a chemical with a warm, eucalyptus-like fragrance and sweet effect on the tongue. In the living plant, eugenol serves to attract pollinating insects and also repel infections and pests.

SPICES AND THEIR FLAVOR COMPOUNDS

Flavor compounds are the tiny molecules that give each spice its unique flavor. When in the mouth, these molecules waft up the throat as a vapor into the nose, where they are experienced as if coming from the tongue. For the cook, learning about these flavor compounds is more than mere nerdy curiosity: it is the key to releasing true creativity in the use of spices in cooking.

SWEET WARMING PHENOLS

The warming, sweetly aromatic spices in this group owe their main flavor to compounds in the phenol family. Often strongly flavored and potent, many share aniseed and eucalyptus flavors, and sometimes bitterness.

COMPOUND EXAMPLES
Eugenol in clove, anethole in fennel.

IN THE KITCHEN
Often strong-tasting and persistent, with the flavor only slowly reduced with cooking. Mostly dissolve and disperse in oil.

WARMING TERPENES

Terpenes are the broadest, most common type of flavor compounds. Spices in this group are dominated by warming terpenes, bringing warmth without strong sweetness. They tend to have woody, bitter, peppery, sometimes minty flavors.

COMPOUND EXAMPLES
Sabinene in nutmeg and mace, germacrene in annatto.

IN THE KITCHEN
Evaporate easily and are lost with prolonged cooking. Generally oil-soluble.

FRAGRANT TERPENES

Spices whose flavor is mostly due to this group of terpenes share pleasantly fresh, pinelike or floral flavor compounds, sometimes with woody notes. In nature, the aromas of these compounds spread far and wide when released.

COMPOUND EXAMPLES
Pinene in juniper, linalool in coriander.

IN THE KITCHEN
Fast-acting and short-lived, generally not tolerating long cooking times. Disperse almost exclusively in oil or alcohol, rather than water.

EARTHY TERPENES

With an earthy, dusty, even burnt flavor, these spices have an abundance of terpenes that convey woody spiciness. Serving in nature as poisons against pests, the compounds are not harmful to humans in small amounts.

COMPOUND EXAMPLES
Cuminaldehyde in cumin, cymene in nigella.

IN THE KITCHEN
Oil-soluble flavors are tenacious and lingering. Best combined with "lighter" fragrances.

PENETRATING TERPENES

Unlike other terpene flavor groups, spices in this group are dominated by powerful terpene compounds that hit the back of the nose and linger on the palate, with usually camphorous, eucalyptus-like, often medicinal flavors.

COMPOUND EXAMPLES
Fenchone in grains of Selim, cineole in cardamom.

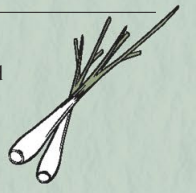
IN THE KITCHEN
Potent and lingering, these spices need to be used in moderation or toasted to mask with other flavors.

CITRUS TERPENES

All these spices share compounds that we recognize as being like citrus fruit, giving them a tangy, refreshing, lemony flavor profile with some flowery and herbal aromas. They are found in many ripe fruits as well as spices.

COMPOUND EXAMPLES
Citronellal in lemon myrtle, citral in lemongrass.

IN THE KITCHEN
Fast-evaporating but found in high quantities in this group, so can withstand longer cooking times.



Flavor groups

Using features shared by compounds, I have organized spices into 12 flavor groups. Their characteristics are described in the chart below, and we have translated the groupings into a Periodic Table of Spices on pp.14-15. Some elements of a spice's taste are not strictly flavor compounds because they cannot be sensed by the nose and so have no aroma or flavor. These substances (technically termed "tastants") act directly on the tongue, and include sugars and tart acids. Many are chemicals intended to deter predators—but which humans can enjoy—causing bitterness, numbness, coldness, or, in the case of pungent compounds, spicy heat.

SWEET-SOUR ACIDS

The fruit-based spices in this flavor group are dominated by sourness from acids, and are typically accompanied by sweetness from plant sugars. Sometimes acids have an aroma, which can be like cheese or sweat.

COMPOUND EXAMPLES
Hexanoic and pentanoic acids in carob, citric acid in amchoor.

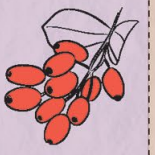
IN THE KITCHEN
Water-soluble and tolerant of long cooking. Suited to dishes containing sugar, which amplifies fruitiness and blunts strong sourness.

FRUITY ALDEHYDES

Aldehyde compounds are found in abundance in fruiting plants and are more subtle on the palate than other flavor compound groups. Spices in this group carry a distinct fruity, malty, or fresh green flavor, sometimes with fatty or sweaty nuances.

COMPOUND EXAMPLES
Nonanal in sumac, hexanal in barberry.

IN THE KITCHEN
Partly water-soluble, but disperse best in oil and alcohol. Aromas do not survive high heats or long cooking times. Cook briefly or use raw to savor their subtleties.



TOASTY PYRAZINES

These spices have been toasted as part of their processing or gain most of their flavor from being fried or toasted. Spices in this group carry nutty, roasted, caramel-like flavors, sometimes with smoky, meaty, fresh bread–like nuances.

COMPOUND EXAMPLES
Each spice develops a unique combination of dozens of pyrazines.

IN THE KITCHEN
Create pyrazines by dry-toasting spices over 266°F (130°C). Flavors spread best in oil and enhance savory dishes, in particular.

SULFUROUS COMPOUNDS

Spices in this group tend to be dominated by oniony and meaty flavors, with cabbage- and horseradish-like nuances and a degree of pungency. In high concentrations, sulfur compounds can smell offensive and fetid.

COMPOUND EXAMPLES
Isothiocyanate in mustard, diallyl disulphide in garlic.

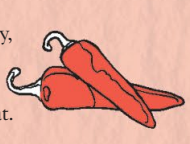
IN THE KITCHEN
Dispersing in fats, the meaty taste of these spices helps bring depth of flavor to vegetable dishes.

PUNGENT COMPOUNDS

These sometimes alarmingly hot spices share compounds that are not flavors at all, but chemicals that create an illusion of burning by hijacking pain nerves that normally send warning signals to the brain above 108°F (42°C).

COMPOUND EXAMPLES
Capsaicin in chili, piperine in black pepper.

IN THE KITCHEN
Pungent compounds have varying strengths and agency, so combine spices for more rounded heat. Cook with fats to fully disperse the heat.



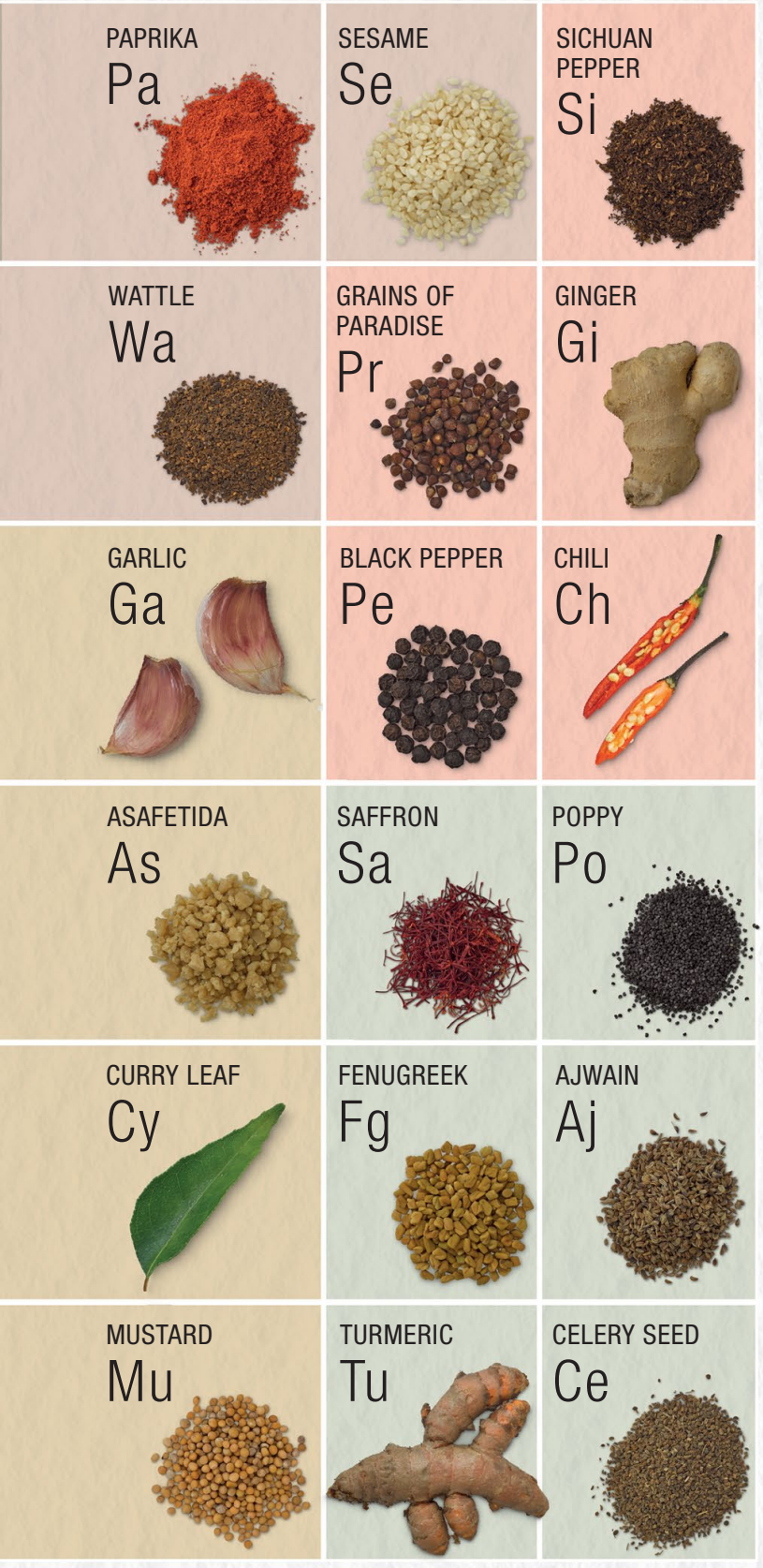
UNIQUE COMPOUNDS

Some compounds are unique in the world of spices or do not fit in other groups. Spices dominated by such compounds can be earthy, mellow, penetrating, or herby, and usually partner with a wide range of other spices.

COMPOUND EXAMPLES
Picocrocin and safranal in saffron, tumerone in turmeric.

IN THE KITCHEN
These spices possess characteristics usually not found elsewhere and will bring unique aromas to a dish.

CINNAMON
Ci
ANISE
An
LICORICE
Lc
VANILLA
Va
DRIED LIME
Li
LEMONGRASS
Le
CASSIA
Ca
STAR ANISE
St
MAHLEB
Mb
CUMIN
Cu
LEMON MYRTLE
Lm
TAMARIND
Ta
CLOVE
Cl
FENNEL
Fe
MASTIC
Mc
NIGELLA
Ni
AMCHOOR
Am
SUMAC
Su
ALLSPICE
Al
CARAWAY
Cw
JUNIPER
Ju
GRAINS OF SELIM
Sl
ANARDANA
Ar
CAROB
Cb
NUTMEG
Nu
DILL
Di
ROSE
Ro
BLACK CARDAMOM
Bl
BAY
Ba
BARBERRY
By
MACE
Ma
ANNATTO
Ao
CORIANDER
Co
CARDAMOM
Cm
GALANGAL
Gg
CACAO
Cc



PERIODIC TABLE OF SPICES

Taking inspiration from the scientific world, I have devised this Periodic Table of Spices as a starting point for a new way of thinking about spices.

Each of the main spices featured in this book has been assigned to one of 12 flavor groups, according to the flavor compound that is most important to its taste profile.

Use the key below to identify the flavor group and turn back to pp.12–13 for a full description of the characteristics defining each group.

Once you have familiarized yourself with the spice groupings, turn the page for step-by-step instructions on how to start using the Periodic Table of Spices to create your own pairings and unique blends.

KEY TO FLAVOR GROUPS

Each group has been assigned a color and the Spice Profiles on pp.80–207 are ordered in their groups, with colored borders matching the colors of the Periodic Table to help with navigation.

- ***Sweet Warming Phenols***
- ***Warming Terpenes***
- ***Fragrant Terpenes***
- ***Earthy Terpenes***
- ***Penetrating Terpenes***
- ***Citrus Terpenes***
- ***Sweet-Sour Acids***
- ***Fruity Aldehydes***
- ***Toasty Pyrazines***
- ***Sulfurous Compounds***
- ***Pungent Compounds***
- ***Unique Compounds***

CREATING SPICE PAIRINGS AND BLENDS

In most instances, spices work well together because they share one or more flavor compounds. In this book, the Periodic Table of Spices and blending science of each spice profile have been devised to help you understand spices through their flavor compounds. Below is a step-by-step guide for how to use this information to create your own unique spice mixes.

Step 1

CHOOSE MAIN FLAVOR GROUP(S)

Consider the flavor groups of the Periodic Table when choosing the main flavors of your dish. Do you want it to be spicy, fruity, earthy, zesty, or something else? You can have one or several main flavors, such as a zesty citrus dessert or a meat dish that's warming and smoky.

▲ *Sweet Warming Phenols*

▲ *Penetrating Terpenes*

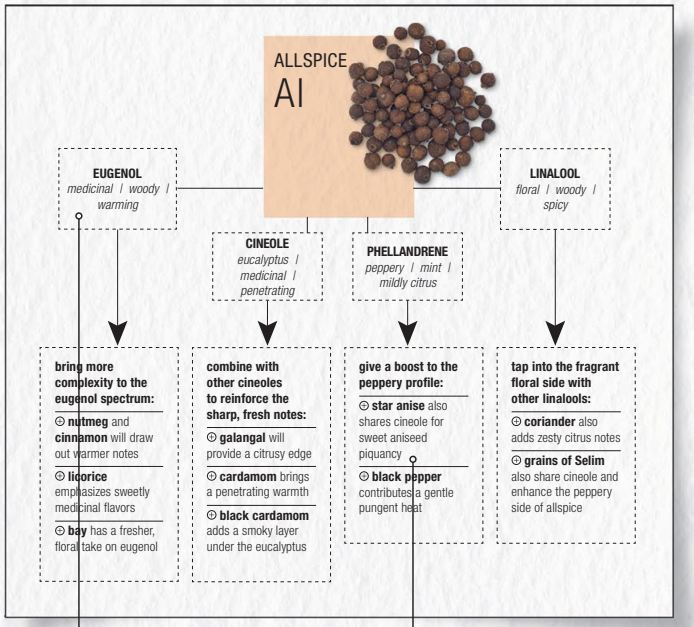
EXAMPLE

You may want to bring a strongly fragrant sweetness to a bean or lentil dish using spices in Sweet Warming Phenols, counterbalanced with an equally strong, but fresher, clean-tasting spice from Penetrating Terpenes. You will now be picking one or two spices from each of these groups to convey these key flavors.

Step 2

CHECK THE BLENDING SCIENCE

Read through the blending science in the relevant spice profiles to get to know the range of flavor compounds that each spice would bring to the dish. Try to make connections through shared compounds, especially between spices in different flavor groups; spices with no flavor compound link are more likely to clash.



Main compounds *are listed with their flavor profile and other qualities*

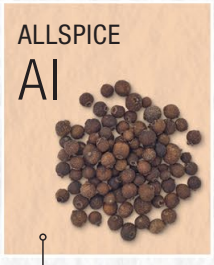
Suggested pairings *link spices through each flavor compound, but are not exhaustive*

> *"Complexity increases with each extra spice, and so will pleasure—research shows that the greater the range of flavors and mouth sensations in a dish, the tastier it will be."*

Step 3

PICK YOUR PRIMARY SPICES

Having reviewed the different flavor compounds in each spice, now settle on the specific spices that will convey the main flavors of the dish. Consider using two spices from the same flavor group to add depth and complexity: they will tend to blend well but bring different nuances for a more rounded base flavor.



Eugenol *is the main compound and has a warm, medicinal flavor*

Anethole *has a licorice flavor and dominates star anise*

+

Cineole *is eucalyptus-like and vital to the taste of galangal*

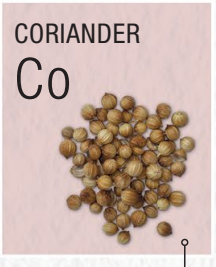
EXAMPLE
Allspice and star anise link together powerfully because they belong to the same flavor group, bringing warmth and sweetness with aniseed overtones. These spices are a particularly great pair because they also share some minor compounds: peppery phellandrene and cineole. Galangal brings a new flavor dimension and since it also contains cineole, the trio harmonize together incredibly well.

Step 4

ADD COMPLEXITY

Develop the blend by bringing in spices from further flavor groups, again selecting through shared flavor compounds. In addition to the spice profiles, use the table on pp.214–217 to explore the full range of main flavor compounds.

+

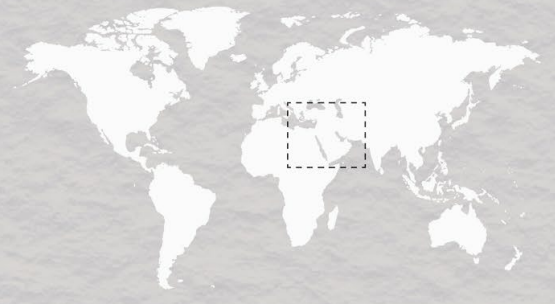


Linalool *is the main compound in coriander and has a lilac aroma*

EXAMPLE
Coriander shares floral linalool with both allspice and star anise. This link helps coriander harmonize with the primary spices and will also reinforce their floral aspects that might otherwise be lost. Another connection is made through its camphene compound, which is related to the penetrating camphor in galangal.

world of | SPICE

Explore the main regions of the spice world via ancient trade routes and modern-day maps, discover the key spices in each cuisine, and recreate signature blends.



World of Spice

MIDDLE EAST

The Middle East has been at the heart of the East–West spice trade for millennia. The spice palette is bright and green on the eastern shores of the Mediterranean, and drier and more intense across the deserts of Arabia, while Iran's fertile lands brim with sweeter, fresher flavors.

SPICE REGIONS

- ***Turkey*** p.23
- ***Syria*** p.22
- ***Lebanon*** p.25
- ***Israel*** p.24
- ***Egypt*** p.28
- ***Iraq*** p.26
- ***Iran*** p.27
- ***Arabian Peninsula*** p.29

Istanbul
The city's location on the edge of two continents made it a meeting point for European and Asian spice traders.

SUMAC
Turkey is one of the world's leading producers of sumac.

On to Europe

Alexandria
This Egyptian city was the main player in the ancient spice trade until power shifted to the Romans.

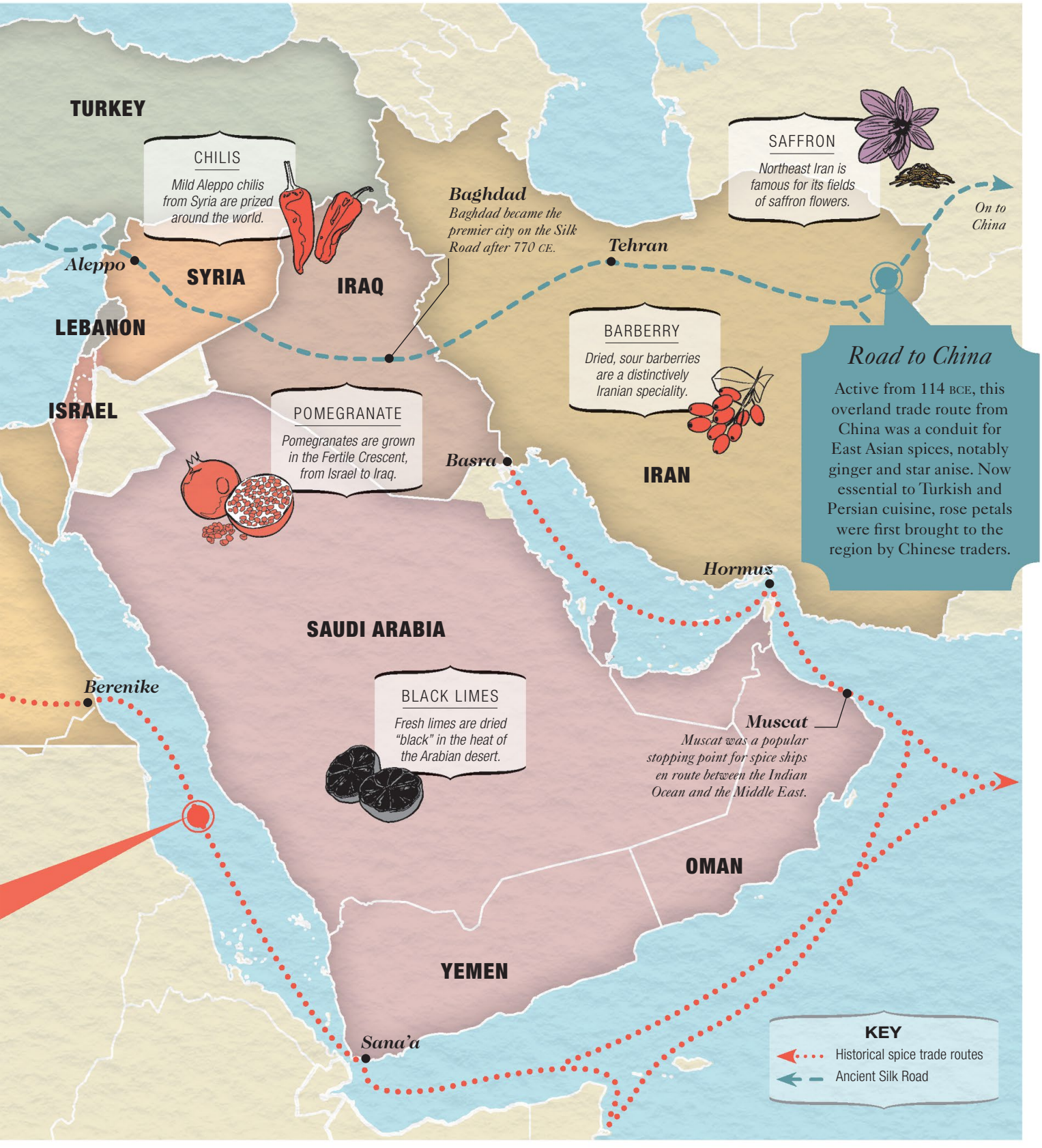
Cairo

EGYPT

CUMIN
Native to Egypt, cumin is grown across the eastern Mediterranean.

Spices from Asia

From 700–1450 CE, global commerce in spices was dominated by Arab merchants, who sailed the trade winds to bring goods from India and Southeast Asia, including turmeric, black pepper, cloves, nutmeg, and nigella.


TURKEY
CHILIS
Mild Aleppo chilis from Syria are prized around the world.
Aleppo
SYRIA
IRAQ
LEBANON
ISRAEL
Baghdad
Baghdad became the premier city on the Silk Road after 770 CE.
Tehran
SAFFRON
Northeast Iran is famous for its fields of saffron flowers.
On to China
BARBERRY
Dried, sour barberries are a distinctively Iranian speciality.
POMEGRANATE
Pomegranates are grown in the Fertile Crescent, from Israel to Iraq.
Basra
IRAN
Road to China
Active from 114 BCE, this overland trade route from China was a conduit for East Asian spices, notably ginger and star anise. Now essential to Turkish and Persian cuisine, rose petals were first brought to the region by Chinese traders.
Hormuz
SAUDI ARABIA
Berenike
BLACK LIMES
Fresh limes are dried "black" in the heat of the Arabian desert.
Muscat
Muscat was a popular stopping point for spice ships en route between the Indian Ocean and the Middle East.
OMAN
YEMEN
Sana'a
KEY
Historical spice trade routes
Ancient Silk Road

SPICE PALETTE

Signature

Aleppo pepper, sumac, allspice, black pepper, garlic
The palette gets its mild, salty heat from the Aleppo pepper; a tang from its native sumac; and a mellow piquancy from allspice.

Supporting

Safflower, cumin, cinnamon, cardamom, nigella, sesame
Syrians have a more sensitive taste for spice than the Turkish or Lebanese, choosing the milder safflower over saffron to flavor and color rice dishes.

Supplementary

Tamarind, nutmeg, caraway, anise
Tamarind paste adds a sweet-sourness to the palette, while nutmeg, caraway, and anise are used to bring richness and licorice spice to cakes and desserts.

SYRIA

Fruity | Warm | Sour

Often overlooked in favor of the cuisines of its better known neighbors, Turkey and Lebanon, it's a bitter irony that Syria's vibrant food culture is making a name for itself only as its people scatter from conflict in the area. The country has plenty to offer: a rich natural larder bursting with fresh herbs, cherries, dates, pomegranates, and nuts, laced with a fragrant and mild spice palette.

> *"Star of the Syrian spice rack is Aleppo pepper, a mild form of chili flakes produced around the ancient Silk Road town of Aleppo."*

LOCAL SPICE BLEND

Za'atar

This nutty, earthy blend of dried herbs and spices is a versatile seasoning for hummus, labneh, cheeses, meats, and fish.

2 tbsp cumin seeds
1 tsp sea salt
2 tbsp sesame seeds
2 tbsp dried oregano
2 tbsp sumac

Dry-roast the cumin in a frying pan, over a low heat, until fragrant, then grind with the salt. Dry-roast the sesame seeds until golden and stir into the mixture with the oregano and sumac.

***Baharat**—simply meaning "spices"—is the blend that defines the Middle East, its smoky mix varying from region to region.*

Lamb kofte with *baharat*, see p.210. ➤

LOCAL SPICE BLEND

Turkish baharat

Use in meat kofte, pilafs, or with roast vegetables, especially eggplant.

2 tbsp black peppercorns
2 tbsp cumin seeds
2 tbsp coriander seeds
1 tsp cloves
½ tbsp cardamom seeds
1 tbsp ground nutmeg
pinch of ground cinnamon
1 tbsp dried spearmint

Finely grind the whole spices and combine with the remaining ingredients. Makes approximately 9 tablespoons.

TURKEY

Fresh | Mild | Smoky

At the crossroads of Europe, Asia, and the Middle East, Turkey has long been a hub for the trading of exotic spices. In the halls of Istanbul's domed Spice Bazaar, sacks of Iranian saffron and Sichuan pepper sit alongside Turkish specialities such as *pul biber*, a mild, coarsely ground chili used as a table condiment, or the darker, smokier *urfa biber*. Dishes from the Aegean and Mediterranean coast tend to use more fresh herbs and less spice than those from eastern areas, where heavier spicing and sweetness bring a more Middle Eastern flavor.

SPICE PALETTE

Signature

***Pul biber*, black pepper, cumin, garlic, sumac**
Turkish spicing is surprisingly subtle, with dishes characterized by the mild heat of *pul biber* and black pepper.

Supporting

***Urfa biber*, paprika, allspice, nigella, cinnamon**
Paprika, allspice, and *urfa biber* impart warmth and richness to meat dishes and soups, while cinnamon is added to sweet dishes, especially in eastern Turkey.

Supplementary

Fenugreek, clove, nutmeg, coriander, cardamom
Look closely, and you'll find spices from all over the world in Turkish cooking—Asian flavors are particularly common.

SPICE PALETTE

Signature

Sesame, sumac, cumin, garlic, paprika

If Israel's palette can be characterized by any blend of flavors, it's this Mediterranean-Middle Eastern flush of warm, sour, and spicy-sweet.

Supporting

Caraway, chili, fenugreek, nigella, black pepper, cinnamon, cardamom, coriander

Spices are particularly popular in Israel's famous breads: aniseedy caraway in Jewish rye bread, as well as nigella seeds in pittas.

Supplementary

Turmeric, hibiscus, rose, saffron, bay

The melting pot of flavors in Israeli cuisine is mirrored in its range of spices, some of which you won't find elsewhere in the Middle East, such as earthy-sweet dried hibiscus flowers.

ISRAEL

Varied | Earthy | Sweet

Although Israel shares much of its menu with neighboring Lebanon, the country draws its sprawling, ever-evolving spice palette from across the globe: fiery chili pastes from Yemen, paprika from Russia and eastern Europe, harissa from North Africa, and, increasingly, flavors from further afield thanks to Israeli travelers returning with Korean, Thai, and Mexican spice blends. The influx of fresh new flavors won't dampen Israel's devotion to its spice traditions, however: you'll still find its *zhug* green chili condiment served alongside falafel, grilled meats, sandwiches, soups, and egg dishes.

***Hibiscus** flowers are steeped in water or ground to powder to release their sharp, cranberry-like fruitiness.*

◀ Sautéed squash and potatoes with poached egg and *zhug*.

LOCAL SPICE BLEND

Zhug

This bright, intensely spicy chili paste is the national condiment of Israel.

1 tsp cardamom seeds
1 tsp coriander seeds
1 tsp cumin seeds
2 green chilis, chopped
2 garlic cloves, chopped
1 large bunch cilantro, chopped
1 large bunch flat-leaf parsley, chopped
2 tbsp olive oil
salt and pepper, to taste
juice of **½** lemon

Toast the dry spices in a frying pan over medium heat, then grind. Pound to a paste with the chilis and garlic. Combine with the herbs and 1 tbsp oil. Season and set aside for 10 minutes. Stir in the lemon juice and loosen with more olive oil.

LEBANON

Bright | Warm | Aniseedy

The Middle East's most famous export, traditional Lebanese mezze, can be found across the Levantine region, often resulting in fierce disputes over origin: hummus, for example, is steadfastly claimed by both Israel and Lebanon. The country's cooks deploy spices liberally, whether on their own or in the ubiquitous seven-spice *baharat*, a staple in every kitchen for use in mezzes, marinades, soups, and stews.

> *"This volatile heartland of the eastern Mediterranean punches way above its weight in its spectrum of spices."*

LOCAL SPICE BLEND

Taklia

A versatile, savory blend usually added to soups and stews just before serving.

3 cloves garlic, peeled and sliced
2 tbsp olive oil
1 tsp ground coriander
a good **pinch** of cayenne
½ tsp sea salt

Fry the garlic gently in the oil, then when it is fragrant but not colored, pour it into a mortar with the coriander, cayenne, and salt, and grind to a paste.

SPICE PALETTE

Signature

Coriander, cinnamon, black pepper, allspice, clove, ginger, nutmeg
A *baharat* blend of these seven spices is used to flavor beef and lamb dishes, such as *kibbeh* beef croquettes, *kafta* skewers, and stuffed vegetables.

Supporting

Garlic, sumac, paprika, cumin, cardamom, sesame, fenugreek
Lebanon's spectrum of warm, nutty, earthy, and sour spices adds depth to meats and salads. Cardamom brings a distinctive sweetness to tea and sweets.

Supplementary

Saffron, turmeric, caraway, anise
The sweet-toothed Lebanese are particularly fond of dishes spiced with aniseed flavors; *meghli* rice pudding or *sfouf* tea cake are especially popular.

SPICE PALETTE

Signature

Black pepper, cardamom, cinnamon, cumin

Black pepper is the preferred seasoning and the other rich, warm spices are paired with lamb, Iraq's favorite meat, in kebabs and stews.

Supporting

Allspice, garlic, turmeric, tamarind, saffron, dried lime

Sour flavors play an important role in Iraqi spicing: tamarind and turmeric, for example, characterize the traditional dish of *masgûf* (grilled carp).

Supplementary

Fenugreek, cassia, paprika, coriander, ginger

Additional spices are drawn from across the globe, with influences creeping in from Latin America, China, Southeast Asia, and India.

IRAQ

Sweet | Fragrant | Sour

Spices have been woven throughout Iraq's rich history and were first cultivated by the rulers of ancient Mesopotamia. The palette was enlivened by the fresh, fruity spices of the Persians, and further added to by traders on the Silk Road and Spice Route, who brought the sweet-and-sour flavors of Chinese cassia and the heady cardamom, turmeric, and fenugreek of South Asia.

> *"Spices are so central to Iraqi home cooking that families have their own unique baharat blended for them at the local market."*

LOCAL SPICE BLEND

Arabic baharat

This Iraqi version of the regional blend is sweet and fragrant, and can be used as an all-purpose rub, marinade, or seasoning.

1 tbsp black peppercorns
1 tbsp allspice
1 tsp cloves
1 tsp coriander seeds
1 tsp cumin seeds
1 tbsp cinnamon
1 tsp grated nutmeg

Grind the whole spices and combine with the cinnamon and cumin.

***Saffron** is the most expensive spice in the world, and Iran is responsible for over 90 percent of its production.*

Persian rice pudding with *advieh*, see p.210. ➤

LOCAL SPICE BLEND

Advieh

A heady blend of Persian spices to sprinkle over savory rice, rub over meats, or add to stews. It is good on Persian rice pudding, too.

2 tbsp dried rose petals
2 tbsp cardamom seeds
1 tbsp cumin seeds
2 tbsp ground cinnamon
2 tbsp ground ginger

Grind the whole spices and combine with the cinnamon and ginger.

IRAN

Floral | Musky | Sour

Iran's spice palette and cuisine are as rich and exciting as its history. In this sprawling intersection between east and west—the center of the Persian Empire and the Silk Road, invaded by Greeks, Arabs, Turks, Mongols, and Uzbeks—you'll find caviar and Chinese noodles, smoked fish and hot-and-sour prawns, and a natural larder brimming with pistachios, pomegranates, mint, walnuts, and the prized Iranian saffron, grown in the northeast. Stews and pilafs are underpinned by Iran's sweet-and-sour spices—sumac, dried limes, barberries, and tamarind—while fragrant rose petals give spice mixes and sweets a hint of the exotic.

SPICE PALETTE

Signature

Saffron, sumac, rose
Iran's famous burnt-red saffron strands—never powder—give seafood and poultry a rich, slightly bitter flavor and rice dishes their vibrant amber color.

Supporting

Dried lime, barberry, angelica, cinnamon, cumin, ginger, turmeric, garlic
Iranian cuisine owes its fruity tang to its dried fruits and sour, citrusy spices, with a rich baseline of fragrant and earthy cinnamon, cumin, and ginger. Turmeric is used to color and add a musky depth to savory dishes.

Supplementary

Fenugreek leaves, curry powder, paprika, tamarind
The subtle bitterness and warmth of fenugreek leaves and drier spices balance the sweetness and sour flavors of Iran's fresh ingredients.

SPICE PALETTE

Signature

Cumin, cinnamon
The go-to spice for savory dishes is cumin, while cinnamon is used just as liberally to add depth to Egypt's array of sweet dishes.

Supporting

Garlic, black pepper, chili, coriander
Tomato sauces are perked up with a fresh palette of garlic, black pepper, and chili flakes, while coriander provides a mellow, citrusy partner to cumin.

Supplementary

Ginger, cloves, bay, cardamom, allspice
You will often find an additional spice or two to partner the main flavor, but Egyptians keep their spicing relatively simple, or reach for the *baharat*.

EGYPT

Fresh | Earthy | Nutty

Flanked by the Red Sea and the Mediterranean, Egypt's ports became the gateway to the riches of the East long before its mercantile heyday in the Middle Ages. Despite its spice-rich history, the modern Egyptian palette is simpler than that of other Levantine countries. Indigenous cumin is the prevailing flavor—its rich, nutty notes enliven the relatively humble ingredients of Egypt's vegetable soups, meat stews, and grain dishes such as *koshari*. Cumin, along with hazelnuts, sesame seeds, and coriander, is also a key flavoring in *dukkah*, a distinctively Egyptian condiment that varies in content from house to house.

LOCAL SPICE BLEND

Dukkah

An everyday blend of spices and nuts that is often served with olive oil and bread or used to season roasted meats or hummus.

5½oz (150g) hazelnuts
5½oz (150g) whole almonds
1 tbsp coriander seeds
1 tbsp cumin seeds
3 tbsp sesame seeds
pinch of salt

Preheat the oven to 400°F (200°C). Spread the nuts on separate baking sheets. Roast the almonds for 8 minutes and the hazelnuts for 10 minutes, shaking the trays every 3 minutes. Toast the seeds over a high heat for 3 minutes, tossing constantly. Grind together the cooled nuts, seeds, and salt.

▲ Hummus and flatbreads served with *dukkah*.

Ancient Egyptians *founded the spice trade, importing spices from Africa and Arabia as early as 3000 BCE.*

ARABIAN PENINSULA

Rich | Dry | Musky

The Arabian spice palette shares many of its rich, fragrant flavors with its northern neighbors: the Levantine trinity of cumin, coriander, and cinnamon, as well as dried limes and saffron from Iran. But as the Arabian peninsula stretches down to Yemen and Oman, with Africa and Asia beyond, the flavors and heat of its food intensify with the climate and terrain. In come cloves and black pepper, masala mixes, turmeric and coconut dishes from Asia, and hot chilis from Africa.

> *"Omani and Yemeni cuisines are justifiably famous for their heady blend of fiery flavors."*

LOCAL SPICE BLEND

Hawaij

A currylike Yemeni blend, popular in slow-cooked meat dishes and soups and as a spice rub. A sweeter version replaces the pepper and cumin with ginger, cloves, cinnamon, or fennel, and is added to coffee and desserts.

1 tbsp black peppercorns
7 tsp cumin seeds
1 tbsp cardamom seeds
1 tbsp coriander seeds
2 tbsp ground turmeric

Grind the whole spices and combine with the turmeric.

SPICE PALETTE

Signature

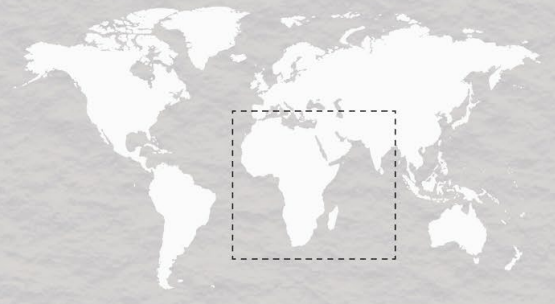
***Baharat*, dried lime, bay**
The signature flavors of Arab *baharat*, dried limes, and bay leaves give slow-cooked dishes and spice mixes a distinctive sour, musky flavor.

Supporting

Saffron, cardamom, clove, cinnamon, cumin, coriander, garlic, chili, black pepper
Lamb and rice dishes are a firm fixture on Saudi menus, and the palette is full of piquant, citrusy spices that cut through the richness of the meat.

Supplementary

Turmeric, nutmeg, caraway
Sweet and slightly bitter, turmeric gives a brightness to the flavor and color of Yemeni spice blends and Omani fish soups.



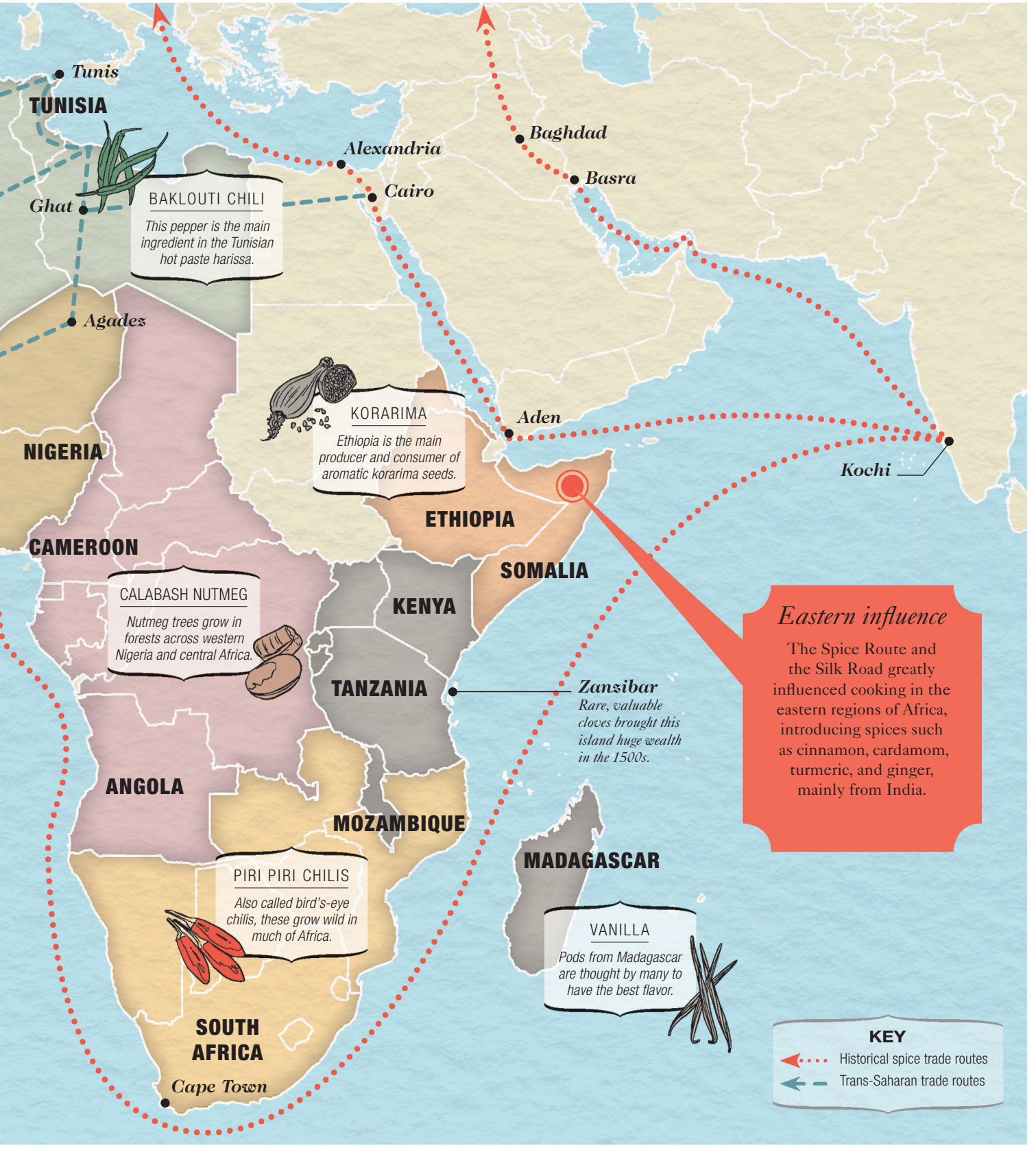
World of Spice

AFRICA

Africa's cuisine is as diverse as the land is vast. From Casablanca to the tip of the Cape, you will find spices that tell a complex story: of kingdoms and empires, of overland and maritime spice routes, of slave trades, of European colonization, and of migration within Africa.

SPICE REGIONS

- ***The Maghreb*** p.33
- ***West Africa*** p.36
- ***Central Africa*** p.35
- ***The Horn of Africa*** p.32
- ***East Africa*** p.34
- ***Southern Africa*** p.37


Tunis
TUNISIA
Ghat
BAKLOUTI CHILI
This pepper is the main ingredient in the Tunisian hot paste harissa.
Alexandria
Cairo
Baghdad
Basra
Agadez
KORARIMA
Ethiopia is the main producer and consumer of aromatic korarima seeds.
Aden
Kochi
NIGERIA
ETHIOPIA
CAMEROON
SOMALIA
CALABASH NUTMEG
Nutmeg trees grow in forests across western Nigeria and central Africa.
KENYA
TANZANIA
Zanzibar
Rare, valuable cloves brought this island huge wealth in the 1500s.
Eastern influence
The Spice Route and the Silk Road greatly influenced cooking in the eastern regions of Africa, introducing spices such as cinnamon, cardamom, turmeric, and ginger, mainly from India.
ANGOLA
MOZAMBIQUE
MADAGASCAR
PIRI PIRI CHILIS
Also called bird's-eye chilis, these grow wild in much of Africa.
VANILLA
Pods from Madagascar are thought by many to have the best flavor.
SOUTH AFRICA
Cape Town
KEY
Historical spice trade routes
Trans-Saharan trade routes

SPICE PALETTE

Signature

***Korarima*, fenugreek, chili pepper, cardamom, cumin, coriander**

Also called false or Ethiopian cardamom, *korarima* is native to Ethiopia and has a similar but milder flavor to true cardamom. The spice is notably used to flavor *kifto*, a type of steak tartare dish.

Supporting

Turmeric, ginger, garlic, nigella, clove

Cloves added to the hottest chilis, cardamom or *korarima*, and salt comprise the *mitmita* spice blend. Other supporting spices help to flavor the many interesting vegetable sides and relishes of the region.

Supplementary

Cinnamon, nutmeg, ajwain, *timiz*

Before the chili pepper arrived, the local species of long pepper (*Piper capense*), known as *timiz*, provided the main source of pungent heat.

THE HORN OF AFRICA

Fiery | Aromatic | Smoky

Ethiopia's capital, Addis Ababa, is home to Africa's largest spice market—a sign of this region's spice diversity. The ubiquitous *berbere* mix and its less complex sister blend *mitmita*, both shared by Ethiopia and Eritrea. are dominated by red hot piri piri chilis. Yet the quintessential taste of Ethiopian cooking comes from bittersweet fenugreek and smoky floral *korarima*. Somalian cuisine, meanwhile, is defined by the fruitiness of coriander, cleanness of cardamom, and earthiness of cumin.

> *"Spices are among the few external influences brought to bear on the unique flavors of Ethiopian cooking."*

LOCAL SPICE BLEND

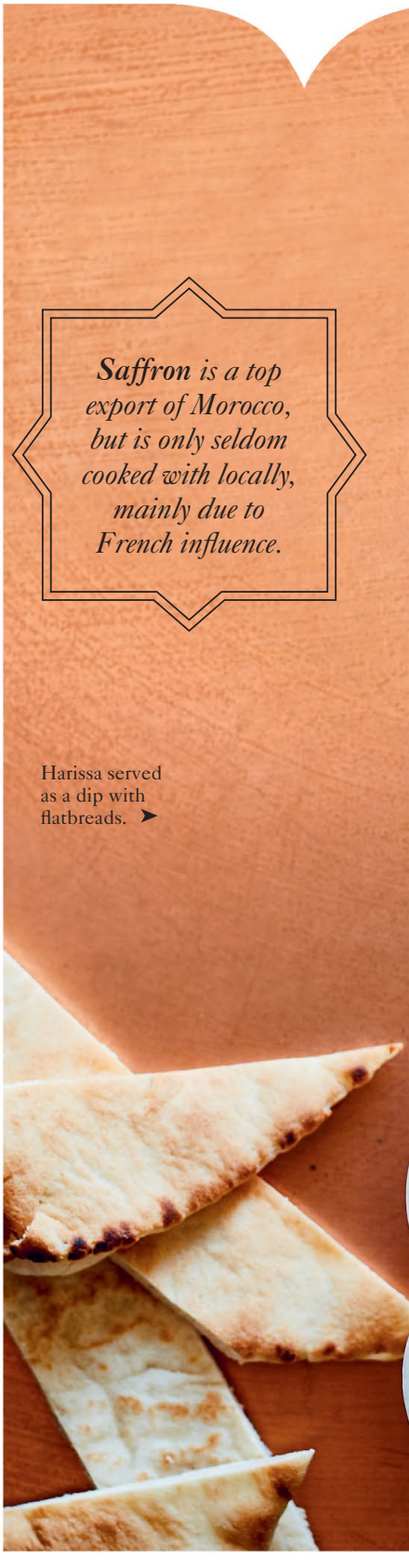
Niter kibbeh

This spiced clarified butter is used as the flavorful base fat for many regional dishes, including hearty *wat* meat stews.

- **1lb 2oz (500g)** unsalted butter
- **1** medium onion, finely chopped
- **2** garlic cloves, finely chopped
- **1 tbsp** grated fresh root ginger
- **1 tsp** fenugreek seeds
- **1 tsp** ground cumin seeds
- **1 tsp** *korarima* or cardamom seeds
- **½ tsp** turmeric powder
- **1 tsp** dried oregano
- **6** basil leaves
- **4** sage leaves

Melt the butter in a pan over medium-low heat. Add the remaining ingredients and cook, stirring, for 20 minutes. Strain through muslin into a sterilized jar.

***Saffron** is a top export of Morocco, but is only seldom cooked with locally, mainly due to French influence.*



Harissa served as a dip with flatbreads. ➤

LOCAL SPICE BLEND

Harissa

Harissa paste is used as a condiment, a dip for bread, or as the main flavoring for stews and sauces.

3½oz (100g) dried red chilis, Baklouti if you can get them, or other moderately hot chilis, such as Kashmiri
3 or 4 large cloves of garlic
1 tsp salt
1–2 tbsp lemon juice
½ tsp cumin seeds, ground
½ tsp coriander seeds, ground
½ tsp caraway seeds, ground
1 tbsp olive oil

Seed the chilis and soak in hot water for 30 minutes. Drain, combine with the other ingredients, and pound or blend to a paste.

THE MAGHREB

Earthy | Rich | Mild

The collective of countries known as the Maghreb is the portal where Africa meets the Middle East and Europe. The region's cuisine has been shaped by cultural exchange between indigenous Berbers and their conquerors through the centuries—Arabs, Ottomans, and French—as well as from the period when Islamic Berbers themselves ruled most of the Iberian peninsula as Al-Andalus. Spicing is sweet and mild for the most part, with cumin the everyday choice, and cinnamon bringing its aromatic notes to rich, fruit-laden tagines. The chili heat of Tùnisia's harissa paste is a sweat-inducing exception.

SPICE PALETTE

Signature

Cumin, cinnamon, ginger, chili
Cumin gives the dishes of the Maghreb their mild and earthy undertones, while cinnamon and ginger add an aromatic edge to tagines, soups, and stews.

Supporting

Coriander, turmeric, clove, paprika, allspice
Arab traders introduced further exotic spices from the East—coriander, turmeric, and cloves—and in the other direction, paprika and allspice were introduced from the Americas.

Supplementary

Pepper, nutmeg, cardamom, fenugreek
These lesser spices tend not to feature on their own and are more usually encountered in the blend *ras el hanout*, a broad combination of spices with local variations that brings together most, if not all, of the above palette of spices.

SPICE PALETTE

Signature

Ginger, cardamom, garlic, cinnamon, clove

Ginger gives East African cuisine piquancy and heat. Kenyan and Ugandan dishes are fairly mild, but ginger is used liberally. Cardamom, clove, and cinnamon add their sweet aromas to the local version of chai tea.

Supporting

Bay, black pepper, cumin, coriander

Pepper and cumin bring heat and earthiness to various blends. Bay and coriander are added to meaty versions of pilau, alongside the standard masala.

Supplementary

***Tsiperifery*, turmeric, chili, sesame**

Tsiperifery is a variety of pepper native to Madagascar, more pungent and citrusy than ordinary black pepper. Crushed sesame features in Ugandan cooking, often paired with spinach.

Spices for an East African pilau masala blend. ➤

EAST AFRICA

Zingy | Sweet | Fragrant

Thanks to the legendary spice islands of the Zanzibar Archipelago, Tanzania has historically been the epicenter of East Africa's spice trade and continues to play the role of dominant influencer in the region's cuisine. Over 2,000 years of trade with Arabia, Persia, and India saw the introduction of warming spices such as cloves, ginger, pepper, cinnamon, and cardamom. Ginger and cardamom traveled farthest inland, making them the most widely used spices of the region. In coastal areas, cooking draws on turmeric and coriander to bring fresh, tropical notes when combined with coconut.

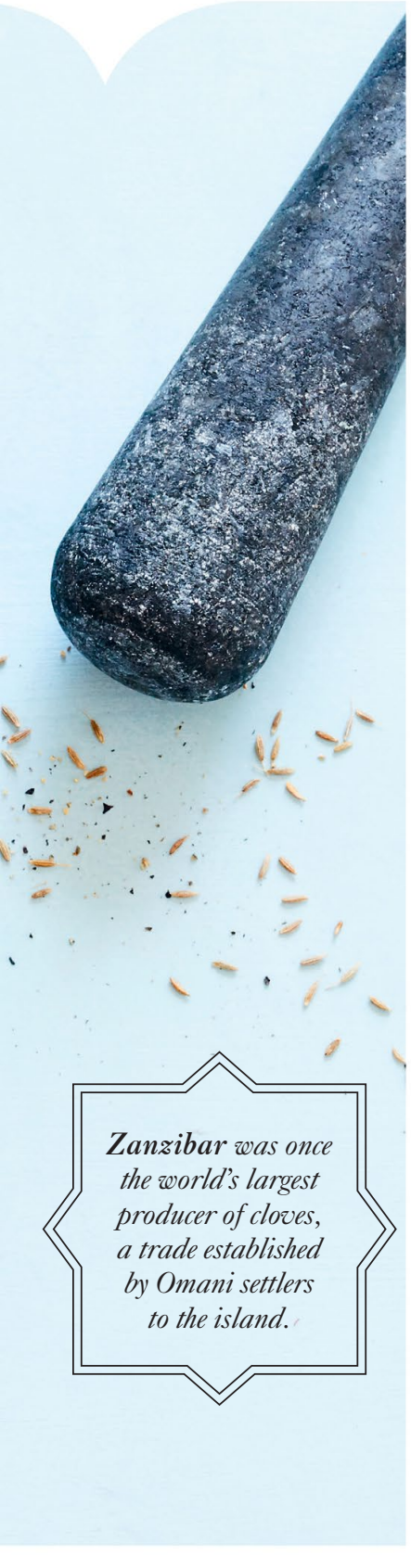
LOCAL SPICE BLEND

Pilau masala

Introduced to the region via India and Arabia, pilau rice is a one-pot dish made with meat or vegetables and spiced with the following masala blend.

½ tsp cumin seeds
½ tsp whole black peppercorns
½ tsp cloves
¼ tsp cardamom seeds
¼ tsp ground cinnamon

Grind the whole spices and combine with the cinnamon. The masala is usually added when frying the onions.



***Zanzibar** was once the world's largest producer of cloves, a trade established by Omani settlers to the island.*

CENTRAL AFRICA

Nutty | Pungent | Local

With the exception of chilis introduced in the 15th century by Portuguese explorers, the cuisine of Central Africa has remained true to its indigenous spice cupboard. Seeds and bark of the *bobimbi* tree are the region's equivalent to garlic, used in almost every local dish, and three native pungent spices provide lingering heat and hints of citrus: Ashanti pepper (*Piper guineense*), grains of Selim, and *mbongo* (*Aframomum citratum*).

> *"Confusingly, 'grains of paradise' is a name applied locally to four different spices: Ashanti, mbongo, grains of Selim,* and *grains of paradise!"*

LOCAL SPICE BLEND

Mbongo mix

Use to flavor Cameroonian "black stew" *mbongo tchobi*, most often made with white fish.

4 tsp ground *mbongo* or black cardamom
1 tsp *bobimbi* or **1 handful** wild garlic or garlic chives
30 *njangsa* seeds or **1 handful** unsalted peanuts
2 calabash nutmeg seeds or **1 tsp** grated nutmeg
1 tsp grains of paradise
4 garlic cloves
1 onion, roughly chopped

Grind the whole spices, combine with the garlic and onion in a blender, add 4 tbsp water, and process until smooth.

SPICE PALETTE

Scotch bonnet chili

ginger

Signature

Bobimbi, njangsa, mbongo
Njangsa are the oil-rich seeds of the *Ricinodendron* tree, bringing a nutty flavor and thickening property to dishes, with a particular affinity for fish.

Supporting

Calabash nutmeg (*Monodora myristica*), chili (Scotch bonnet), ginger, grains of paradise
Milder than ordinary nutmeg, indigenous calabash nutmeg found its way to the Caribbean—where it is called Jamaican nutmeg—via the European slave trade. Ginger, chili, and grains of paradise are regular additions to soups.

Supplementary

Garlic, bay, black pepper, curry powder
The region is gradually embracing non-native spices, with garlic, pepper, and bay leaf used to season local versions of the jollof rice dish, and curry powder employed as a flavor shortcut in Cameroonian curries.

SPICE PALETTE

grains of Selim

grains of paradise

Signature

Chili, ginger, garlic
Most savory dishes begin with these backbone spices, almost always used together. Chilis tend to be at the hot end of the scale, used fresh, dried, or powdered.

Supporting

Grains of Selim, grains of paradise, *iru*, *prekese*, nutmeg, bay
Grains of Selim and grains of paradise both bring pepperiness. *Prekese* are the sweetly fragrant pods of a pealike plant, also known as "soup perfume." *Iru* are the fermented seeds of the locust bean tree, with a strong ammonia smell, used as a condiment.

Supplementary

Turmeric, Ashanti pepper, clove, anise
Ashanti pepper (see p.35) is most important in soups, notably *banga* (palm nut), peanut, or pepper soups. Clove-spiced sour millet porridge is a popular breakfast dish in Accra.

WEST AFRICA

Hot | Pungent | Smoky

West Africa is a region of diverse landscapes and peoples, and equally varied culinary traditions. It can, however, be useful to consider the cuisine divided according to its two major language groups: French and English. In Francophone countries, the use of mustard paste and souring agents such as vinegar or lemon juice is widespread, notably in the popular chicken dish *poulet yassa*. Anglophone countries, by contrast, bring intense depth of flavor to dishes through smoked, fermented, and dried ingredients, pepping up almost any savory dish with dried or smoked and ground crayfish, or fermented locust beans.

> *"Originally from Senegal, the spicy rice dish jollof is raising the profile of West African cuisine across the world."*

LOCAL SPICE BLEND

Yaji

This is the spice mix used to marinate the meat for *suya*, West Africa's street food kebabs.

10 strands of grains of Selim
1 tbsp whole Ashanti pepper
5 tbsp crushed *kuli-kuli* or peanut puffs, e.g. Osem Bamba
5 tbsp ginger powder
2 tbsp cayenne pepper flakes
1 dry stock cube, crumbled
½ tsp salt
black pepper, to taste

Break up the grains of Selim and grind with the Ashanti pepper; you may need to sift out any fibers. Combine with the remaining ingredients and mix well.

***Durban** is known as the biggest Indian city outside India, and Victoria Street Market is famed for its spices.*

Beef bunny chow made with Durban curry masala, see p.211. ➤

LOCAL SPICE BLEND

Durban curry masala

This blend from South Africa's third city is characterized by bold heat with a touch of sweetness.

2 tsp coriander seeds
2 tsp cumin seeds
1 tsp cardamom seeds
½ tsp fenugreek seeds
2 cloves
2 in (5 cm) cinnamon stick
6 tsp mild chili powder
1 tsp cayenne pepper
½ tsp ground ginger

Toast the whole spices in a frying pan over medium heat until fragrant, then grind and combine with the remaining spices.

SOUTHERN AFRICA

Hot | Sweet | Diverse

If South Africa is known as the Rainbow Nation, the country's cuisine encompasses a similarly broad diversity of spices, largely determined by the colonial past. Early Dutch colonization has left a legacy of Indonesian-influenced spicing in Cape Malay dishes, while the influx of Indian laborers under British rule makes Durban a contender for the premier curry city in the world. Mozambique is the fiery quarter of Southern Africa with its Portuguese-influenced piri piri chili blends. By contrast, flavors within landlocked Botswana and Zimbabwe are much milder, with spices used carefully and sparingly.

SPICE PALETTE

Signature

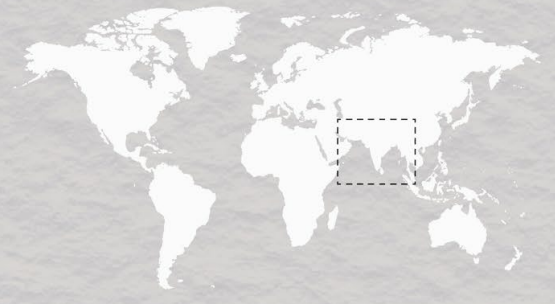
Cinnamon, turmeric, coriander, chili, garlic
Regional cooks don't hold back if chili is called for, but turmeric is often used for a milder currylike flavor. Cinnamon enlivens the Dutch-derived custard dessert *melktert*, and coriander adds fruitiness to *biltong*, a dry-cured meat.

Secondary

Clove, black pepper, cumin, ginger, cardamom, bay
Further combinations of Asian spices produce a variety of Indonesian- or Indian-inspired masala blends, while bay leaf flavors the savory custard topping of *bobotie*, South Africa's national dish.

Supporting

Nutmeg, anise, allspice
These three sweet, fragrant spices are sometimes used alongside coriander in regional variations of *biltong*.



World of Spice

SOUTH ASIA

Each of South Asia's diverse communities has its own distinctive seasonings, from a simple sprinkle of cumin to complex spice blends. Native spices, such as cardamom and cinnamon, are central to many cuisines, while chili and coriander, once non-local, are now valuable exports.

SPICE REGIONS

- ***North India*** p.40
- ***Himalayan Belt*** p.41
- ***Central India*** p.42
- ***West India*** p.44
- ***East India and Bangladesh*** p.43
- ***South India and Sri Lanka*** p.45

A rich coast

India's Malabar coast was the main export outlet for Kerala's peppercorns, and has long been at the center of the global spice trade. In the 16th century, Portugal was the first European nation to enrich itself by trading peppercorns from this area.

Kashgar
To China
Balkh
Lhasa
The capital of Tibet was an important city on the southwest Silk Road.
Spice hub
Calcutta (now called Kolkata) was one of the cities that grew out of the colonial trading posts set up where the overland Silk Road and maritime Spice Route met. Spice merchants from all over the world traded here.
BLACK CARDAMOM
Black cardamom flourishes on the cool foothills of the Himalayas.
Delhi
NEPAL
BHUTAN
FENNEL
Rajasthan is a major producer of fennel.
AMCHOOR
Amchoor is a popular flavoring in central India's vegetarian dishes.
Karachi
BANGLADESH
Bharuch
Kolkata
MUSTARD
Mustard seeds and oil are key to traditional Bengali cooking.
INDIA
Mumbai
Goa
When the Portuguese colonized Goa in the 16th century, they introduced chilis from the New World.
Yangon
Chennai
CINNAMON
Eight cinnamon species are native to Sri Lanka; all but one grow wild.
CARDAMOM
Around 75% of India's cardamom is grown in the state of Kerala.
SRI LANKA
Colombo
Sri Lanka
Formerly called Ceylon, this island was for centuries the only known source of cinnamon.
To East Asia

SPICE PALETTE

Signature

Cumin, turmeric, chili, ginger, garlic

The foundation of essential masala mixes and pastes, these versatile spices are often used together and provide an obliging base for main ingredients.

Supporting

Cassia, clove, cardamom, Indian bay, fennel

These sweet spices bring warmth and fragrance. Indian bay is from the same family as cinnamon, and tastes like a mix of cloves, cinnamon, and allspice.

Supplementary

Black cumin, anardana, peppercorn, saffron

Smoky, tart, warming, and sweet, these spices grab the senses with their distinctive personalities, and perform well as solo seasonings or as part of a blend.

Chickpea curry spiced with garam masala, see p.211. ➤

NORTH INDIA

Complex | Earthy | Fragrant

From no-frills rustic cooking in Punjabi homes, to the refined flavors of Mughal palace kitchens, and kebabs and hearty dhals finished with sizzling cumin at roadside cafés, this food is as widely traveled as the spices that have earned it such international acclaim. During the heyday of princely Maharajas and Nawabs, royal chefs created flamboyant spice blends for sophisticated dishes, many of which featured a dozen or more aromatic seasonings. Home cooks also draw on a versatile spice box, preferring the warming nature of garam masalas over brute chili heat.

LOCAL SPICE BLEND

Garam masala

Many households have their own variation of this warming spice blend, which is used in the same way as you would a seasoning.

scant 1 oz (25 g) black cardamom seeds
scant 1 oz (25 g) cassia, broken into pieces
scant 1 oz (25 g) black peppercorns
¼oz (10 g) black cumin seeds
2 blades mace
¼oz (10 g) cloves
⅛ nutmeg, chopped

Grind all the spices to a fine powder and sift to remove any fibers.

***Black cumin**—or shahi jeera—is from a different but related plant to regular cumin and has a slightly smoky flavor.*

HIMALAYAN BELT

Astringent | Fiery | Warming

Cooking in the Himalayas is shaped by nature's harvest in the foothills along with frugal high-altitude pickings. There's an emphasis on wholesome pulses, often finished with a *tarka* of warming fried cumin seeds, chilis, and ginger. Spices tend to be basic, and in areas such as Bhutan, chilis are elevated to a main ingredient. Ginger-spiced steamed dumplings, chili-laden Tibetan broths, and Chinese noodles coexist with such Punjabi staples as parathas, naans, and homely dhals.

> *"Longevity of food is of primary focus, and spiced pickles and preserves perk up meals during the cold winter months."*

LOCAL SPICE BLEND

Timur ko chhop

The Himalayan equivalent of salt and pepper: use as a seasoning for soups, a dip for fried meats, or as a fiery pick-me-up over fried potatoes, noodles, and curries.

1 tsp *timur* or Sichuan pepper
2 tbsp red chili powder
1 tsp salt

Dry-roast the *timur* in a frying pan, over low heat, until fragrant, stirring all the time. Mix with the chili and salt, and grind to a powder.

SPICE PALETTE

Signature

Fenugreek, chili, *timur*, ginger, garlic
The bitterness of fenugreek seeds contrasts with the nuttiness of lentils and pulses, while *timur* (a type of Sichuan pepper) lends a more citrusy, but still astringent flavor to Nepali masalas.

Supporting

Black cardamom, asafetida, turmeric
Asafetida's sulfurous aroma is softened to mellow sweetness after cooking, which complements the earthiness of smoky black cardamom and turmeric.

Supplementary

Coriander, ajwain, clove, cumin
Ajwain seeds and cloves have robust and bitter flavors to enliven everyday meals, along with more discreet coriander and cumin.

SPICE PALETTE

Signature

Coriander, cumin, dried red chilis, turmeric, ginger
The key spices of central India provide depth of flavor and richness to everyday vegetables, lentils, and pulses, and although they are used across South Asia, their versatility is very much center stage here.

Supporting

Asafetida, fennel, nigella
These bold seasonings play a significant role in pickles and preserves, and their feisty character complements and contrasts with main ingredients, too.

Supplementary

Ajwain, amchoor
With its thymelike flavor, ajwain is often used with fish and starchy vegetables, while amchoor cuts through richness with its fruity tartness.

CENTRAL INDIA

Tart | Nutty | Assertive

Influenced by the culture of neighboring Rajasthan, Gujarat, and Maharashtra, India's central states transform vegetarian staples into memorable dishes with a creative use of contrasting spices. A well-known simple seasoning is a trio of fried nigella, fenugreek, and fennel seeds, which lends a pickled flavor to softened vegetables and meaty masalas. Meat eaters are catered to with predominantly Mughal-style dishes. In Bhopal, Madhya Pradesh's capital city, cafés serve biryanis, kebabs, and aromatic curries spiced with garam masala emboldened with plenty of pounded coriander seeds.

> *"A sprinkling of amchoor mango powder can elevate fried potatoes to star status in central India."*

LOCAL SPICE BLEND

Chaat masala

A seasoning sprinkled over street snacks, fruit salads, and kebabs.

- **2 tbsp** cumin seeds
- **1 tsp** coriander seeds
- **1 tbsp** black peppercorns
- **3 tbsp** amchoor
- **1 tsp** ground ginger
- **½ tsp** asafetida
- **1 tbsp** kala namak (Himalayan black salt)
- **1 tsp** salt

Toast the whole spices in a frying pan, over medium heat, until fragrant. Leave to cool and then mix with the other ingredients and grind to a powder.

Panch phoran *translates as "five spices." Bengali versions substitute local spice radhuni for mustard seed.*

LOCAL SPICE BLEND

Panch phoran

This whole spice mix is a Bengali and Bangladeshi speciality, and is particularly good for flavoring dhals and vegetable dishes.

2 tsp cumin seeds
2 tsp brown mustard seeds
2 tsp fennel seeds
1 tsp nigella seeds
1 tsp fenugreek seeds

Simply mix together the whole spices. To use, fry a teaspoonful in oil or ghee at the start of cooking, or to temper a dish just before serving.

EAST INDIA AND BANGLADESH

Pungent | Sweet-sour | Mustardy

Cooks in the river delta of West Bengal and Bangladesh embrace complex spice blends, which work especially well with fish and seafood. For religious reasons, many Hindus in Kolkata don't cook with onions and garlic, preferring the distinctive nature of nutty-tasting poppy seed paste, popped mustard seeds, ginger, and the aromatic five-spice mix of *panch phoran*. Bangladeshi Muslims favor more strident seasonings in such dishes as Mughal-style biryanis and beef curries infused with whole spices.

Masor tenga fish curry featuring *panch phoran*, see p.211.

SPICE PALETTE

Signature

Chili, mustard, turmeric, cumin, ginger, garlic
Although chilis get top billing in hilly regions, flavorings in the plains are characterized by contrasting spice combinations cooked in mustard oil.

Supporting

Poppy, black cardamom, fennel
Taking the edge off the more assertive signature spices is a cast of "carrier" seasonings, which provide depth of flavor and richness to classic dishes.

Supplementary

Coriander, fenugreek, nigella
Fried nigella seeds lend a nutty and pickled flavor to vegetable and meat dishes, and their piquancy is complemented and balanced by bitter fenugreek and citrusy coriander seeds.

SPICE PALETTE

mustard

dried red chili

curry leaf

Signature

Kokum, dried red chili, cumin, turmeric, mustard, ginger, garlic

These spices form the backbone of most cooking in this region, although garlic is shunned by the Jain community for religious reasons.

Supporting

Fenugreek, curry leaf, black pepper

Dishes from this region show restraint in their use of fenugreek seeds and curry leaves, but there's no holding back when peppercorns are roasted and ground into warming masalas.

Supplementary

Asafetida, sesame

Sesame seeds are so much more than a garnish: they add richness and a nutty character when roasted and ground, and are good vehicles for sulfurous asafetida.

➤ Vindaloo paste ready for use in a pork or chicken curry, see p.212.

WEST INDIA

Bitter | Sour | Sweet

The use of spices in western India reflects varied landscapes and cultures. The arid climate of Rajasthan and parts of Gujarat differs from the tropical atmosphere of Maharashtra and Goa, and the cooking styles are equally distinct. Savory dishes in Gujarat are characterized by sweet-sour flavors underpinned by jaggery and pungent spices such as fenugreek seeds and dried red chilis. Royal Rajasthani dishes are acclaimed for their richness and chili-laden masalas, while along the Konkan coastline, hot and sour fish curries, balanced by creamy coconut masalas, are emblematic. Goa is famed for accommodating vinegary and garlicky Indo-Portuguese dishes.

LOCAL SPICE BLEND

Vindaloo paste

The Goans adopted and adapted this fiery, sweet-sour mix from the Portuguese.

1½ tsp cumin seeds
15–20 dried Kashmiri chilis, whole
1 tsp black peppercorns
2 tsp black mustard seeds
1 tsp fenugreek seeds
6 cloves
1 tsp cardamom seeds
2 in (5 cm) piece of cassia
½ star anise
6 tbsp cider vinegar or palm vinegar
1 tsp fine salt
2 tsp jaggery or date palm sugar

Toast the spices in a frying pan over a medium heat until fragrant, then grind. Transfer to a bowl, add the vinegar, salt, and jaggery, and mix to a stiff paste.

***Kokum** is the dried rind of a fruit in the mangosteen family, used like tamarind to impart a sour flavor.*

SOUTH INDIA AND SRI LANKA

Fresh | Zesty | Robust

From the cardamom hills of Kerala to Sri Lanka's cinnamon plantations and Andhra Pradesh's renowned chili harvest, this region's culinary traditions come from centuries of trading in spices. Influences from the Portuguese, French, Dutch, Southeast Asians, and British have been adapted to suit local tastes, but it's the stalwarts of *sambhar* (tart lentils with vegetables), rice in all its guises, and sour fish masalas that give distinction to this region's cuisine.

LOCAL SPICE BLEND

Gunpowder

Sprinkle this distinctly southern condiment over rice dishes, *dosa* (lentil and rice pancakes), and *idli* (steamed rice cakes). When moistened with a little oil, it makes a robustly spiced dip.

scant 1 oz (25 g) chana dhal or split yellow lentils
scant 1 oz (25 g) split urad dhal or black gram lentils
scant 1 oz (25 g) fresh coconut or coconut flakes
1 tbsp black sesame seeds
2 tbsp curry leaves (about 20)
6–8 red chilis, mild or hot according to taste
1 tbsp tamarind pulp
¼ tsp asafetida
2 tsp jaggery or date palm sugar

Toast the lentils in a dry pan over low heat for 7–10 minutes, stirring continuously, until colored. Transfer to a bowl and leave to cool. Toast the coconut for 3–4 minutes in the same way. When it turns pale golden, add the sesame seeds, curry leaves, and chilis, and continue cooking until the chilis have darkened.

Stir in the tamarind pulp and asafetida, and toast for 1 minute before adding the sugar. Turn off the heat and stir until the sugar has melted. Scrape all these ingredients into the lentils and leave to cool, before grinding to a coarse powder. Spread on a tray to dry for 1 hour.

SPICE PALETTE

tamarind

cardamom

Signature

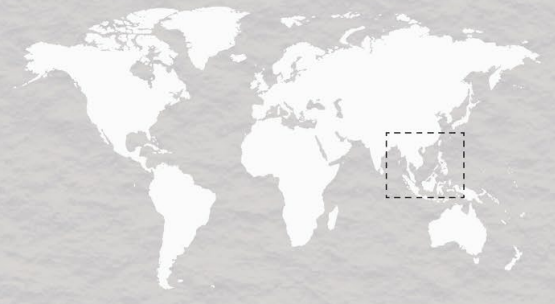
Tamarind, mustard, fenugreek, cumin, cardamom, ginger, garlic, curry leaf, chili
Dishes are characterized as mild and mellow or bold and fiery depending on whether the spices have been dry-roasted, fried, pounded, or left whole.

Supporting

Cassia, cinnamon, black pepper, nutmeg, asafetida
Cassia is stronger and harsher in flavor than cinnamon, and lends itself to boldly seasoned masalas. Both spices work well with the warmth of peppercorns, nutmeg, and chilis.

Supplementary

Sesame, star anise, mace
It's likely that star anise was introduced to this region by Chinese traders, since very little is grown in South Asia. Its fennellike sweetness is well matched with the nuttiness of toasted sesame seeds and aromatic mace.



World of Spice

SOUTHEAST ASIA

When Portuguese traders brought the chili pepper to Southeast Asia, they started a culinary revolution: it now dominates spice palettes across the region, along with characteristic fresh spices, such as garlic, ginger, and lemongrass.

SPICE REGIONS

- ***Myanmar*** p.48
- ***Thailand, Laos, and Cambodia*** p.49
- ***Vietnam*** p.50
- ***Malaysia and Singapore*** p.51
- ***Philippines*** p.53
- ***Indonesia*** p.52

Spice wars
The West's demand for spices made this region and its sea routes hot property. Between the 16th and 18th centuries there were many skirmishes and conflicts as the Portuguese, Spanish, Dutch, and British vied for domination of the area.
Macau
VIETNAM
Hanoi
LEMONGRASS
These aromatic stalks play a key role in Vietnamese cuisine.
ANNATTO
A New World native, annatto is now grown in the Philippines.
CAMBODIA
Phnom Penh
Manila
Spanish galleons sailed between Manila and Acapulco, in modern-day Mexico, to trade spices and other goods.
PHILIPPINES
Source of spice
Known as the Spice Islands, the Moluccas (now Malukus) were for centuries the only source of cloves, nutmeg, and mace, making them a magnet for traders and invaders—first from China, India, and the Middle East, later from European nations.
SINGAPORE
The British used Singapore as their center for spice trading and processing.
MALAYSIA
GALANGAL
Native to Java, galangal is now cultivated all over Southeast Asia.
INDONESIA
Ambon
Jakarta
The Dutch first landed in Jakarta in 1596, and it soon became the hub for Dutch spice traders in the region.
KEY
Historical spice trade routes

SPICE PALETTE

Signature

Ginger, garlic, chili
Early Chinese, and more recent Thai, influences have had a lasting impact on the Burmese spice palette: few savory dishes omit the base notes from this trio of fresh spices.

Supporting

Garam masala, mild curry powder, sesame, coriander, lemongrass, turmeric, cumin
Centuries of trade across the Bay of Bengal have seen Indian flavors well integrated into local recipes, with garam masala a particularly popular blend.

Supplementary

Black pepper, star anise, cinnamon, curry leaf, tamarind, poppy
Spices that pack a punch without flooring other flavors are valued in Myanmar: the aromatic warmth of pepper, star anise, and cinnamon; sulfurous curry leaves; sour tamarind; and richly nutty poppy seeds.

MYANMAR

Punchy | Fragrant | Savory

Varied terrain, climate, and ethnicity bring eclectic flavors to the Burmese table, where dry spices from India and Bangladesh are used sparingly to enhance the flavor of freshly pounded spice pastes. The cuisine is less sweet than that of neighboring Thailand, with sour notes popular, and a preference for subtle pungency over pure heat. Fresh, fragrant leaves (both cultivated and wild) find their way into most dishes, as do various fermented fish products.

> *"Influences from over 100 indigenous groups, and from powerful neighbors, feed into Myanmar's rich bank of traditional recipes."*

LOCAL SPICE BLEND

Burmese garam masala

India's most famous spice mix is also popular in Myanmar. Use as the basis for spicing a dish, or like a seasoning added at the end of cooking.

- **1 tsp** coriander seeds
- **1 tsp** black peppercorns
- **1 tsp** cumin seeds
- **2** dried bay leaves
- **1 tsp** cardamom pods
- **1 tsp** cloves
- **1 in (2.5 cm)** cinnamon stick
- **2** star anise

Toast all the spices in a frying pan, over low heat, until fragrant. Leave to cool before grinding into a fine powder.

***Pandan leaves** are used to impart a vanilla-like flavor, particularly to coconut-based sweet dishes.*

Thai salad of sliced steak, chili and lime dressing, and *khao kua*. ▼

LOCAL SPICE BLEND

Khao kua

This ground roasted rice powder, infused with fresh spices, is a key ingredient in both Laotian *larb* and Thai beef salad. Its unique texture means nothing else can be used as a substitute.

5 tbsp uncooked glutinous ("sticky") rice
1 lemongrass stalk, sliced
1 thumb-sized piece of galangal or ginger, sliced
3 makrut lime leaves, roughly torn

Toast all the ingredients in a frying pan over a medium heat, stirring frequently, until the rice turns golden brown. When cool, pick out the spices and pound the rice using a pestle and mortar until coarsely ground.

THAILAND, LAOS, AND CAMBODIA

Hot | Fresh | Clean

No other country along the spice route embraced the chili pepper as enthusiastically as Thailand. It's impossible to imagine Thai cuisine without liberal quantities of chili, though the blander flavors of the Cambodian kitchen do hint at what pre-chili Thai food would have tasted like. Other spice staples were less eagerly adopted and, like cooks in landlocked Laos, Thai chefs still prefer freshly pounded spice pastes. Cambodian cuisine, meanwhile, draws its more subtle heat from the black pepper that has been grown in the country since the 13th century.

SPICE PALETTE

Signature

Chili, garlic, coriander root, lemongrass
All four fresh spices are near ubiquitous in Thai and Laotian cuisine. Cambodian cooks use less chili but enthusiastically embrace the rest.

Supporting

Lime leaf, galangal, ginger, *krachai* (wild ginger), black pepper, tamarind
Several roots in the ginger family, along with makrut lime leaves, provide further fresh flavors, while tamarind is drawn on for sour notes, and black or white pepper for slow-burning heat.

Supplementary

Turmeric, clove, nutmeg, cinnamon, fennel, cardamom, pandan leaf, green pepper
Although widely available throughout the region, dry spices tend to find their way into a limited number of dishes rather than everyday cooking.

SPICE PALETTE

lemongrass

star anise

Signature

Ginger, garlic, chili
A Chinese influence can be seen in this trio of fresh spices, which provide the foundation that supports all the herbs so beloved by Vietnamese cooks.

Supporting

Lemongrass, coriander root, star anise, allspice, turmeric, dill, pandan leaf, black pepper
Aromatic spices add a rich flavor profile to broths and stews, while black pepper provides background heat in dishes deemed too delicate for chili.

Supplementary

Cardamom, licorice, fennel, cinnamon, clove
Rarely center stage, these spices are often used to bring in background notes of sweetness and warmth.

VIETNAM

Fresh | Warm | Delicate

While not as influenced by the spice trade as Malaysia or Indonesia, Vietnam nevertheless keeps a well-stocked spice cupboard. Most dishes carry some vital base notes from dried aromatics, but, on the plate, it tends to be the abundance of fresh herbs that stands out more. Southern Vietnamese cuisine is more richly spiced than its northern counterpart, while sour, salty notes are prevalent throughout the country. To an already well-balanced Vietnamese kitchen, French colonialists brought a delicate way with more European spices, such as dill, fennel, and licorice.

LOCAL SPICE BLEND

Nuoc cham

No Vietnamese table setting is complete without a bowl of *nuoc cham* dipping sauce, used for dunking anything from spring rolls to grilled meats and seafood.

2 bird's eye chilis, roughly chopped
1 garlic clove, roughly chopped
2 tsp palm sugar
juice of **½** a lime
2 tbsp Vietnamese fish sauce (*nuoc mam*)

Place the chili, garlic, and sugar in a pestle and mortar, and pound into a paste. Squeeze in the lime juice, add 2 tablespoons of water and the fish sauce, then mix well.

▲ Prawn summer rolls for dipping in *nuoc cham*, see p.212.

Bird's eye chilis are popular in Vietnam and were probably introduced in the 16th century by the Portuguese.

MALAYSIA AND SINGAPORE

Complex | Rich | Fusion

The southern Malay port of Melaka was ideally placed to become a major trading hub, both for ships plying the Indo-Chinese seas, and those bound for more distant destinations on the spice route. As a result, throughout Malaysia and Singapore, significant Chinese, Indian, and Muslim communities endure to this day, and the regional cuisine is distinguished by a willingness to embrace such varied cultural influences and experiment with new flavors. The concept of fusion food, as we know it, was arguably born in Melaka, where Chinese, Indian, Arabic, and European ingredients often find themselves in the same cooking pot.

LOCAL SPICE BLEND

Malaysian fish curry paste

Layering a fresh base of galangal, garlic, and shallots with an Indian-style dry spice masala, this classic fusion paste can be used to make a quick fish curry by mixing it with coconut milk and simmering with chunks of any firm white fish.

2 tsp coriander seeds
1 tsp cumin seeds
½ tsp fennel seeds
½ tsp black peppercorns
4 medium-sized dried chilis
½ tsp turmeric

thumb-sized piece of galangal or ginger, peeled and roughly chopped
3 large garlic cloves, roughly chopped
1¾ oz (50 g) shallots, roughly chopped

Lightly toast the whole dry spices in a frying pan, leave to cool, then grind to a powder along with the turmeric. In a food processor or using a hand blender, blitz together the galangal, garlic, and shallots with a splash of water to form a purée. Mix the dry masala with the fresh purée to form the curry paste.

SPICE PALETTE

galangal

curry leaf

Signature

Ginger, garlic, chili
The classic Southeast Asian flavor trilogy forms the base of most savory recipes in Malaysia and Singapore, but the three are rarely used on their own.

Supporting

Cardamom, turmeric, dried chili, black pepper, clove, coriander seed and root, cumin, cinnamon, curry leaf, lemongrass, galangal, tamarind, pandan leaf, lime leaf
Dried spice mixes add warm, earthy base notes to support the fresh aromatics of the likes of lemongrass, makrut lime, and curry leaves.

Supplementary

Fennel, anise, star anise, dried ginger, cassia, Sichuan pepper, sesame
Malay cooks were enthusiastic adopters of most new arrivals along the Spice Route, creating richly flavored dishes with multi-layered spicing.

SPICE PALETTE

Signature

Garlic, ginger, shallot
Indonesian cooks draw on a wide range of spices, but few are used as extensively as this trio, which form the base notes for countless recipes.

Supporting

Nutmeg, mace, clove, salam leaf, galangal, lemongrass, pandan leaf, lime leaf, tamarind, chili, turmeric, cumin, cinnamon
Indigenous nutmeg, mace, and cloves mingle with fresh, aromatic leaves and roots—including sour, astringent salam leaf—and the warm notes of Spice Route imports.

Supplementary

Black pepper, coriander, curry leaf, cardamom, curry powder, Sichuan pepper, caraway, anise
Further spices from India, along with Sichuan pepper from China, and caraway and anise from the Mediterranean, complete Indonesia's broad-ranging arsenal of flavors.

INDONESIA

Vibrant | Complex | Diverse

Spread across an archipelago of more than 17,000 islands with strong natural resources and long-established trade routes, Indonesia enjoys a spice palette that's as eclectic as the heritage of its people. The traditional saying "if your eyes do not water, the food is not good" hints at a nation that fully embraced the 16th-century arrival of the chili pepper, but there is more to Indonesian cuisine than eye-watering heat. Fragrant local spices mix with exotic imports from Persia, India, and China to create dishes with complex depth of flavor.

LOCAL SPICE BLEND

Bumbu

Many Indonesian recipes are based on some kind of *bumbu* (spice paste). Every region—and cook—has their own favorite version. This one's quite classic.

1 tsp coriander seeds
3 cloves
½ tsp white peppercorns
1 pinch grated nutmeg
½ in (1.5 cm) galangal or ginger, peeled and roughly chopped
1 in (2.5 cm) fresh turmeric, peeled and roughly chopped
6 shallots, roughly chopped
3 garlic cloves, roughly chopped
2 red chilis, roughly chopped
1 tsp shrimp paste
1 tbsp vegetable oil, for frying

You can use a blender, but the best flavor is achieved by pounding using a pestle and mortar: start with the dry spices, then add fibrous galangal and turmeric, followed by the remaining fresh ingredients, finally mixing in the shrimp paste.

Heat the oil in a wok or frying pan, add the spice mixture, and cook over high heat, stirring frequently, for approximately 5 minutes, or until the paste turns golden. Cool before using.

***Adobo** is a Spanish term applied by colonists to the native Filipino technique of preserving meat with vinegar and spices.*

The simple selection of spices for *adobo* marinade. ▼

LOCAL SPICE BLEND

Adobo marinade

Filipino recipes often start with a simple marinade, usually with coconut vinegar in a starring role. Use this recipe to marinate chicken or pork overnight. See pp.208–209 for a spiced-up version of adobo.

3½ fl oz (100 ml) coconut or cider vinegar
1¾ fl oz (50 ml) soy sauce
3 garlic cloves, crushed
1 tsp black peppercorns
2 bay leaves

Place all the ingredients in a small saucepan and bring the mixture to a boil. As soon as it boils, remove from the heat and allow to cool to room temperature before using.

PHILIPPINES

Mild | Colorful | Aromatic

Given how important food is to the Filipino way of life (five meals a day is the norm), dishes are surprisingly unadventurous with their spicing. Most classic recipes use no more than two or three spices, and very few would classify as "spicy" in the hot sense. Despite more than 300 years of Spanish rule, which clearly left their mark on a spice palette that feels more European than Asian, the Philippines didn't take to the chili pepper in anywhere near the same way as the Spanish and their trading partners along the Spice Route.

SPICE PALETTE

Signature

Bay, black pepper, garlic
This "holy trinity" of Filipino cuisine is in nearly every savory recipe, including the unofficial national dish, *adobo*.

Supporting

Annatto, turmeric, ginger, lemongrass, pandan leaf
Spices are rarely used to add heat, but often as natural food coloring (red from annatto, yellow from turmeric) or for their aromatic properties.

Supplementary

Chili powder, paprika, tamarind
When Filipinos do reach for the hot stuff, they tend to choose powder over fresh chilis, or opt instead for paprika. Tartness is valued over heat, and tamarind is the main flavor constituent of the popular *sinigang* broth.

World of Spice

EAST ASIA

Despite being at the far eastern edge of the Old World, East Asia has influenced the global spice trade hugely, from key stops on 15th-century trade routes to being the world's fourth-largest spice producer today. Most of the spices here are mild; Sichuan pepper is a tongue-tingling exception.

SPICE REGIONS

- ***West China*** p.61
- ***North China*** p.58
- ***East China*** p.59
- ***South China*** p.60
- ***South Korea*** p.56
- ***Japan*** p.57

The road begins
The Silk Road was the world's greatest trade thoroughfare until the 15th century, when faster sea routes were found. The Chinese city of Chang'an (now Xi'an) marked the start of this 4,000-mile (6,400-km) network.
CHINA
Xi'an
The Western Market in the old city of Chang'an was a meeting place for traders from all over the world.
PERILLA SEEDS
Also known as shiso, perilla is grown mainly in central Japan.
SESAME
Grown widely in East Asia, sesame is one of the world's oldest crops.
Beijing
GINGER
Ginger from China's Shandong region is prized for its high quality.
JAPAN
SOUTH KOREA
Yeosu
SICHUAN PEPPER
This key spice is a distinguishing feature of East Asian cuisine.
Shanghai
Nagasaki
Portuguese traders made Nagasaki their Japanese base in the late 16th century.
LICORICE
Licorice gives meat marinades in southern China a sweet-salty tang.
CASSIA
This sweet spice grows in the tropical climate of southern China.
Macau
TAIWAN
Yangon
Flavor exchange
The spice trade between China and the West went both ways: spices such as cassia traveled west to Central Asia and Europe, while ginger and saffron went east and became integral to cooking in many regions of China.
Manila
Chengdu
The city's market is known worldwide for the quality of its Sichuan peppercorns.
KEY
Historical spice trade routes
Ancient Silk Road

SPICE PALETTE

Signature

Sesame, red chili, garlic

Korean spicing is full-bodied and robust, but subtle, too, with the pungency of chilis and garlic often balanced by the rich, toasty flavors of sesame, or mellowed through fermentation in dishes such as kimchi.

Supporting

Ginger, black pepper, perilla seeds

Supporting spices such as ginger and pepper add deeper notes of pungency, with hints of mint and licorice from the perilla seeds.

Supplementary

Green chili, cinnamon

While red chilis provide the fire in fermented dishes, green chilis and cinnamon bolster the pungent and sweet aspects of Korean dishes.

SOUTH KOREA

Fiery | Warm | Pungent

Korean cooking has only recently become as popular across the world as other long-established Asian flavors, but with its intoxicating blend of heat and acidity in a cuisine that is complex, robust, and subtle, it has quickly come to be a favorite. Unsurprisingly, given Korea's location and history of colonization by China and Japan, influences and spices from these neighbors abound, with chilis, ginger, and garlic playing important roles. Yet the key techniques of fermentation and preservation in which they are employed create flavors and dishes that are unique to this country.

LOCAL SPICE BLEND

Yangnyeomjang

A very popular and deeply flavored, pungent seasoning sauce. It also makes a great dipping sauce and marinade.

2 tsp white sesame seeds
3 tbsp soy sauce
1 tbsp toasted sesame oil
½ tsp rice vinegar
2 tsp *gochugaru* (dried chili peppers)
½ tsp caster sugar or honey
1 garlic clove, crushed
1 spring onion, sliced

Toast the sesame seeds in a frying pan, over high heat, stirring until just golden. Mix with the other ingredients and keep in the fridge for up to a week.

***Perilla seeds** are from a plant in the mint family. They have a nutty, slightly menthol-aniseed flavor.*

◀ Pan-fried tofu with spring onions and *yangnyeomjang*.

JAPAN

Fresh | Mild | Bright

For a relatively small archipelago, Japan is surprisingly diverse in its cooking and spicing. The southern "barbarian" cuisine was developed in the 16th and 17th centuries through interaction with the few foreigners who were allowed to visit the island. The Portuguese introduced deep-frying, chilis, and vinegar, the Chinese brought ramen, gyoza, and dumplings, and the British introduced curry. This Western-influenced cuisine contrasts with the more subtle *washoku* (Japanese cuisine) found elsewhere in the country.

> *"All Japanese cooking shares an emphasis on the natural world, with seasonality at the heart of everything."*

LOCAL SPICE BLEND

Shichimi-togarashi

This aromatic mixture can be used as a table condiment or for flavoring curries, grilled meats, and noodle dishes.

- **2 tbsp** *sanshō* or Sichuan pepper, finely ground
- **2 tbsp** dried orange, yuzu, or lemon peel
- **4 tbsp** chili powder
- **2 tbsp** nori seaweed flakes
- **2 tsp** black sesame seeds
- **2 tsp** hemp seeds, flax seeds, or chia seeds
- **2 tsp** garlic powder

Simply mix together all the ingredients.

SPICE PALETTE

Signature

Sesame, *sanshō*, ginger

The richness of sesame, citrus heat of *sanshō* (similar to Sichuan pepper), and fresh zing of ginger are representative of a cuisine that manages to be both pungent and subtle.

Supporting

White pepper, chili, garlic, star anise

Additional levels of heat come from the fire of chilis and the slow burn of white pepper, while garlic and star anise bring complex aromas of sulfur and licorice.

Supplementary

Clove, allspice, cinnamon, black pepper

These stronger spices are used sparingly, their aim being to layer flavors without overwhelming the key Japanese elements of freshness and brightness.

SPICE PALETTE

Signature

Ginger, sesame, Sichuan pepper
Freshness and simplicity are at the heart of this region's dishes, in which spices are used sparingly alongside lamb, beef, fish, and wheat.

Supporting

Star anise, garlic
Tofu and fresh vegetable dishes in Shandong cooking make use of fragrant star anise, while among Beijing's Muslim population garlic is combined with lamb and beef.

Supplementary

Cumin, chili
Having originated in the kitchens of Chinese Muslims, *yangrou chuan* (lamb skewers) are coated in cumin and chili and are a favorite in Beijing.

NORTH CHINA

Salty | Sour | Light

In a country as vast as China there are huge variations in cuisine, but when it comes to spicing it's a more integrated picture, with most of the country incorporating the gentle spices used in the Shandong, Henan, and Beijing cuisines of northern China. Shandong cooking is characterized by subtle flavors that preserve rather than dominate the main ingredients. Henan features more delicate but harmonious flavors, and Beijing draws influences from both, with an emphasis on sour notes provided by the dark vinegar used throughout the region.

> *"Shandong is regarded as the primary cuisine of China's eight major regional cuisines."*

LOCAL SPICE BLEND

Shandong spice bag

This collection of spices is used to infuse the master stock for many northern Chinese chicken stews, such as Dezhou- or Daokou-style.

10 cardamom pods
2 star anise
½ tbsp whole Sichuan pepper
½ tbsp cloves
½ tbsp ground cumin
3 in (7.5 cm) cinnamon stick
4–5 in (10–12 cm) piece of licorice root
dried peel of an orange or tangerine

Place all the ingredients in a piece of muslin or spice bag, tie tightly, and drop into the cooking water.

▲ Muslin and ingredients ready to make a Nanjing spice bag.

***Lotus seeds** have a mild, sweet flavor reminiscent of fresh almonds and pine nuts.*

LOCAL SPICE BLEND

Nanjing spice bag

These spices are combined with sliced fresh ginger and Shaoxing wine to flavor the stock for the renowned Nanjing salted duck (see p.212).

6 cloves
4 star anise
1 tsp whole white pepper, crushed
6 bay leaves
dried peel of an orange or tangerine
1 tsp licorice root powder
1 tsp salt

Place all the ingredients in a piece of muslin or spice bag, tie tightly, and drop into the cooking water.

EAST CHINA

Subtle | Aromatic | Sweet

Eastern Chinese cuisine is a contrasting mix of flavors determined largely by the varying terrain. Inland, the Yellow Mountains and the Huangshan area are the preserve of unique foraged ingredients in Anhui cuisine, which is often sweetened with sugar to create hearty peasant food. The coast, by contrast, taking in Jiangsu, Zhejiang, and Shanghai, has a refined gourmet cuisine whose emphasis is on subtly aromatic flavors that highlight the abundant sea and river food of the region.

SPICE PALETTE

Signature

Ginger, white pepper, Sichuan pepper, sesame
The signature spices of this region never dominate; rather they are used to bring out the flavors of the fish or meat component of a dish.

Supporting

Star anise, cinnamon, lotus seed
The four styles of Jiangsu's cuisine use sweet aromatics like star anise and cinnamon in dishes such as Wuxi spare ribs. Desserts like lotus porridge are another favorite.

Supplementary

Black cardamom, fennel, cumin, licorice
Suzhou's pastries are made with a wide range of spices and spice-based ingredients that offer smoky, sweet, salty, and nutty flavors, as well as powerful aromatics.

SPICE PALETTE

Signature

Garlic, ginger, chili, sesame
South China's signature spices intensify and enhance the techniques that are geared toward preserving the flavor, color, and texture of the main ingredients.

Supporting

Black pepper, *shajiang*, five-spice powder
Woody black pepper and camphorous *shajiang* powder add a kick to many dishes, while five-spice is used to enhance sweetness and fragrance.

Supplementary

White pepper, licorice
Licorice root replaces five-spice where a more lingering, bitter, aniseed flavor is desired. In Taiwan, white pepper is often paired with pork belly.

SOUTH CHINA

Sour | Aromatic | Sweet

If there's one Chinese cuisine that has traveled throughout the world, it's the Cantonese food from Guangdong, the most southerly of the country's eight great food traditions. Thanks to extensive emigration from this largely coastal region, cooking techniques such as steaming and stir-frying traveled the world. Simple condiments and spicing—light soy sauce, garlic, ginger, and sesame oil—dominate in Canton cooking, but other parts of south China's cuisines, notably Hunan, Fujian, and Taiwan, offer more intense flavors—spicy, sour, sweet, and bitter—via techniques such as drying and preserving and a wider use of spices.

LOCAL SPICE BLEND

Five-spice powder

Yes, you can buy this in any supermarket, but homemade is truly a million times better. Use as a rub for roasting meats, or add to stir-fries and stews.

2 star anise
1 tsp fennel seeds
1 tsp cloves
2 in (5 cm) cinnamon stick
1 tbsp whole Sichuan pepper

Simply grind all the spices to a fine powder, sifting out any fibers if necessary.

Prawn stir-fry flavored with five-spice, see p.213.

***Shajiang** is also known as sand ginger, and has the same fresh heat as ginger, with a mildly medicinal edge.*

WEST CHINA

Fruity | Warm | Earthy

The Silk Road introduced the Sichuan region to less familiar spices brought by travelers from neighboring western and central Asia. The result was a wide blend of flavor sensations, including sour, sweet, bitter, salty, hot, and spicy, especially in the far-west region of Xinjiang. Here, where the population is more than 50 percent Muslim, spices such as cumin and saffron, as well as dried fruits, feature heavily in lamb, chicken, and vegetable dishes from Uyghur and Kazakh cuisine.

> *"Western Chinese cuisine is dominated by Sichuan pepper, used in the region's cooking for more than 2,000 years."*

LOCAL SPICE BLEND

Chili black bean sauce

This is a homemade version of *doubanjiang*, the Sichuan fermented bean paste. Use as a marinade, dip, or in stir-fries.

7 oz (200 g) red bird's eye chilis, finely chopped
1¾ oz (50 g) fermented black beans, rinsed and chopped
2 tbsp vegetable oil
1 tbsp rice wine
2 tsp dark rice vinegar
1 tbsp sugar
3 garlic cloves
3 in (7.5 cm) piece of ginger, chopped

Fry the chilis and beans in the oil for 1 minute. Add the wine and vinegar and simmer for 3 minutes. Add the sugar and simmer for 10 minutes. Then add the garlic and ginger, and cook until the oil floats on the surface. Store in the fridge for up to 3 weeks.

SPICE PALETTE

Signature

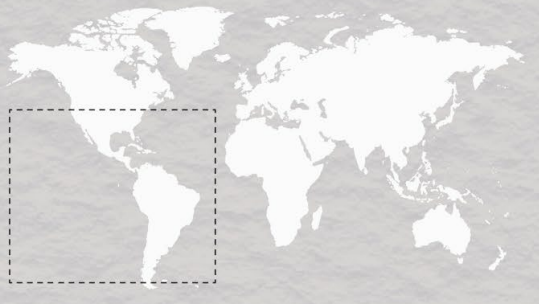
Bird's eye chili, Sichuan pepper, garlic
In classic Sichuan dishes such as beef in chili broth, this trio of spices often dominates the flavor.

Supporting

Star anise, ginger, sesame, black cardamom
Used in both Sichuan and Xinjiang cuisine, star anise, ginger, sesame, and black cardamom add complexity to dishes such as bang bang chicken and hotpot.

Supplementary

Cumin, saffron, cinnamon
In Kashgar, the market is filled with the flavors that made their way to this Uyghur region from the Middle East, including cumin, cinnamon, and saffron.



World of Spice

THE AMERICAS

An amalgamation of flavors and textures from mountains high, valleys low, seas and oceans, forests and islands—plus an array of influences from all corners of Asia and Europe—the spice map of the Americas is eclectic, bold, and complex.

SPICE REGIONS

- ***North America*** p.68
- ***Mexico and Central America*** p.65
- ***The Caribbean*** p.64
- ***Pacific South America*** p.69
- ***The Amazon*** p.67
- ***The Andes*** p.66

To Asia

Two-way traffic

Spices traveled in both directions between continents. Cloves, pepper, and cinnamon reached the New World by sea from Asia; in return, chilis, vanilla, and cocoa beans were all transported back to the Old World.

To Asia

KEY

Historical spice trade routes

UNITED STATES
San Francisco
PAPRIKA
Fresh, dried, or smoked, this spice is common in North American blends.
United States
The US is the world's largest importer of spices, with vanilla and pepper being the most popular.
MULATO CHILI
Brown-black mulato chilis are grown extensively in Mexico.
To Europe
ALLSPICE
Allspice is the only spice exclusively grown in the western hemisphere.
Havana
MEXICO
CARIBBEAN
Veracruz
Jamaica
Explorer Christopher Columbus, who was searching for the source of black pepper, instead discovered allspice on Jamaica in the 1490s.
Panama
Acapulco
In the 17th century, spices that arrived here from Asia were sent overland to Vera Cruz, and then by sea to Spain.
CUMARI CHILIS
These pea-sized peppers grow wild in the Amazon rainforest.
CACAO
Ecuador produces high-quality cacao, used to make premium chocolate.
Manaus
PERU
BRAZIL
Lima
Cusco
MOLLE
This spice is used to make chicha, a traditional spiced beer.
La Paz
A new world
Between the 15th and the 18th centuries the search for spices led European explorers on a series of voyages in uncharted seas. Their discovery of the Americas—the New World, as they called it—radically redrew the world map.
CHILE
Santiago
Rio de Janeiro
In 1502, the first Europeans to see Rio were members of a Portuguese spice-hunting mission.
GARLIC
Chile is one of the Americas' main producers of garlic.

SPICE PALETTE

Signature

Scotch bonnet chili, allspice, clove, ginger, nutmeg, cinnamon
Apart from Scotch bonnet, these staples are used across both sweet and savory recipes, with native allspice joined by fragrant spices from Asia.

Supporting

Black pepper, cumin, garlic, paprika, habanero
Mainly used to create greater depth in one-pot dishes, these spices bring flavors from South Asia, the Mediterranean, and Central America.

Supplementary

Turmeric, coriander, fenugreek, cayenne, nigella
The first three spices are integral to West Indian curry powder, cayenne is used in hotter jerk blends, and roasted nigella seeds flavor breads and vegetable dishes.

THE CARIBBEAN

Adventurous | Bold | Spicy

When European explorers went looking for the Indies, they found instead the Caribbean Islands. Centuries of empire-building ensued, almost wiping out the indigenous peoples and turning the West Indies into a new trading hub on the Spice Route. Such forces made Caribbean cuisine into the melting pot that it is today, fusing Native American, African, Creole, Spanish, Dutch, Portuguese, British, Latin American, Persian, South Asian, and Indonesian cuisines.

> *"The Caribbean's varied cultural influences make for adventurous spicing, including sweet, sour, hot, tangy, and earthy flavors."*

LOCAL SPICE BLEND

Jamaican jerk rub

A dry seasoning used to marinate chicken, fish, pork, and beef. Invented in Jamaica and adapted around the Caribbean.

- **2 tsp** allspice
- **1 tsp** whole black peppercorns
- **½ tsp** cloves
- **1 tsp** chipotle or cayenne powder
- **1 tsp** paprika
- **1 tsp** grated nutmeg
- **1 tsp** ground ginger
- **½ tsp** ground cinnamon
- **2 tsp** onion powder
- **2 tsp** garlic powder
- **1 tsp** dried thyme
- **2 tsp** brown sugar
- **2 tsp** sea salt

Grind the whole spices and combine with the rest of the ingredients. Flavor intensity depends on marinating time.

***Mexican oregano** has pronounced citrus and aniseed notes. Dried, it is added to chili powder blends.*

Roasted vegetables served with *mole* sauce. ▼

LOCAL SPICE BLEND

Mole mix

Each country has its own version, always made with three different chilis.

2 each dried ancho, pasilla, and mulato chilis
3 tbsp cacao nibs
1 tbsp sesame seeds
¾ in (2 cm) piece of cinnamon stick
¼ tsp cumin seeds
¼ tsp anise seeds
¼ tsp whole black peppercorns
¼ tsp cloves
¼ tsp dried thyme
¼ tsp dried marjoram
1 dried bay leaf, crumbled

Toast the whole spices in a dry frying pan over medium heat, stirring, until fragrant. Mix with the remaining ingredients and grind. Stir into fried onions and garlic, then simmer with chopped tomatoes for a mole sauce.

MEXICO AND CENTRAL AMERICA

Hot | Toasted | Complex

The range of spices used in everyday Mexican and Central American dishes is as complex as the region's historical culinary influences. Cultural fusion is key: Belizean cuisine draws from the Maya, the Garifuna, Creole, and even the British, while Mexico's dishes can thank Mayan, Aztec, and Spanish-colonial influences. The Mayans frequently made use of red and green jalapeño chilis; the Aztecs used chipotle chilis, cacao, and vanilla. All of these spices made their way around the world via the Spanish conquistadores, who in return brought cumin, pepper, cloves, and cinnamon.

SPICE PALETTE

Signature

Chili (ancho, jalapeño, pasilla, mulato, chipotle, *chile de arbol*), paprika, cumin
For that fiery kick, any of 60 different chilis offering varying degrees of heat are used, either fresh, whole dried, or powdered, while cumin is essential to chili powder mix.

Supporting

Black pepper, garlic, cinnamon, clove, vanilla
Black pepper is usually slow cooked to draw out its complex pungency. Savory and sweet dishes draw on the latter three spices, with cinnamon traditionally flavoring local chocolate bars.

Supplementary

Cacao, sesame, allspice, Mexican oregano, coriander, annatto
The first three spices all contribute to *mole* sauce, while Mexican oregano and coriander seeds bring extra complexity to chili blends. Annatto is mainly used for coloring meats, rice, and stews.

SPICE PALETTE

Signature

Chili (*ají amarillo*, *rocoto/locoto*, *merquén*), cumin, garlic
Chilis lead Andean cuisine, offering heat, freshness, and color, and often starring as the main ingredient. Spicy sauces pep up any slow-cooked dish.

Supporting

Pepper (white and black), *molle* (pink pepper), turmeric, cinnamon, paprika (sweet and smoked)
These warming spices tend to be added to slow-cooked stews and soups to create depth of flavor and color.

Supplementary

Annatto, coriander, mustard
More usually seen in Mexico and Central America, annatto brings color to Andean dishes, too. Coriander and mustard seeds add subtly aromatic and warming touches.

THE ANDES

Warming | Earthy | Piquant

Spanning some 4,500 miles, the Andes mountain range traces a route from Argentina and Chile, crossing through Bolivia, Peru, and Ecuador, up to Colombia and Venezuela. People who live in or close to the Andes at 3,250 to 10,000 ft (1,000 to 3,000 m) or more above sea level usually slow cook hearty dishes such as stews and soups. Chilis play a dominant role; *ají amarillo* (yellow chili) has been cultivated for more than 8,000 years and was a key ingredient in Inca cuisine. In Andean Peru, *uchucuta* is a spicy salsa made from *rocoto* chili and herbs; *llajua* is the Bolivian and Argentine equivalent.

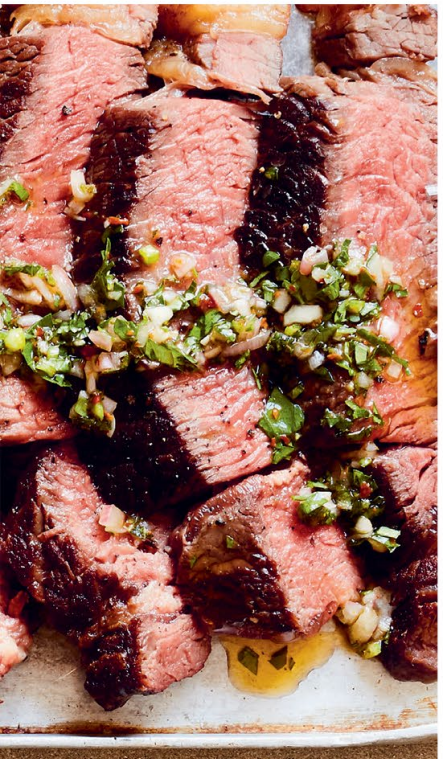
LOCAL SPICE BLEND

Chimichurri

A popular fresh spice and herb sauce, widely served with sausages and steak.

1 tsp chili powder
½ tsp dried chili flakes
½ tsp paprika
2 garlic cloves, finely chopped
1 onion, finely chopped
4 tsp finely chopped parsley or cilantro
1 tsp finely chopped oregano
3 tsp white or red wine vinegar
6 tbsp olive oil
salt and black pepper, to taste

Place all the ingredients in a bowl and stir well to combine them.



▲ Slices of steak dressed with *chimichurri*.

***Molle** are the dried pink berries of the Peruvian peppertree. They are similar to peppercorns, but the plants are unrelated.*

THE AMAZON

Exotic | Mysterious | Hot

Ranging across nine different countries, the Amazon is the world's largest rainforest. Ancestral influence, convergence between the rainforest's three key countries—Brazil, Peru, and Colombia—plus an array of European influences, most significantly from Portugal and Spain, all play their part in this extensive larder. Amazon chilis are some of the world's hottest, and are often—along with garlic, cumin, and turmeric— used to marinate meat and fish.

> *"Dominating the spice wheel are chilis, grown here since pre-Columbian times."*

LOCAL SPICE BLEND

Tucupí

A Brazilian brothlike sauce made from cassava root and served with duck, pork, or fish.

4½lb (2kg) sweet cassava root, peeled and roughly chopped
2 garlic cloves, finely chopped
3–4 hot, fresh red chilis, finely chopped (or more to taste)
1 tsp whole black pepper, ground

Blend the cassava with 1¼ pints (750ml) water in a food processor to form a thick purée. Transfer to a muslin cloth placed over a bowl and squeeze out the starchy juice.

Leave to settle, then strain off the liquid into a jug, discarding the sediment. Cover the liquid and leave at room temperature for 24 hours to ferment. Pour into a pan, stir in the spices, bring to a boil, and simmer for 30 minutes.

SPICE PALETTE

Signature

Black pepper, chili (*ají amarillo*, *ojito de pez*, *pinguita de mono*, *pucunucho*, *cumari*, *malagueta*, cayenne), garlic, cumin
With hundreds of native chili species, in all shapes and sizes, and ranging from mild to fiery hot, it's little wonder that they cross the spectrum to be used in many dishes.

Supporting

Annatto, açaí berries, *jambú*, tonka beans, turmeric
Jambú is a flower whose numbing effect leads to its nickname of "toothache plant". It is used in *tacacá*, one of Brazil's most popular soups.

Supplementary

Priprioca*, *guaraná*, ginger, cinnamon, clove, paprika, vanilla, *copoazú*, *macambo
The dried roots of *priprioca* (a type of sedge grass) offer up a peppery hit, while *guaraná* seeds are used as a stimulant more than for their flavor, but are very common. *Copoazú* and *macambo* are relatives of cacao.

SPICE PALETTE

Signature

Chili (jalapeño, poblano, ancho, cayenne), garlic, pepper (black and white), vanilla
After garlic and chilis, pepper and vanilla are the most common spice imports, adding everyday warmth to savory and sweet dishes, respectively.

Supporting

Paprika, mustard, ginger, nutmeg, cinnamon, cloves
Milder forms of mustard are used particularly in table condiments, while nutmeg, cinnamon, and cloves are the spices of choice for sweet baking.

Supplementary

Anise, sesame, cumin, paprika, turmeric, mace
These diverse spices are used in dishes drawn from the cuisines of the Middle East and Asia, which have an increasingly strong influence on the North American food scene.

NORTH AMERICA

Hot | Sweet | Eclectic

European settlers brought a limited range of spices with them to North America, mainly as a way to preserve food for the long journey. Gradually spices from Central America (chili, annatto), the Caribbean (allspice), and South America (*molle*) left their mark, though only chili has enjoyed an enduring popularity thanks to the proximity of Mexico. Today, North American cuisine is a true fusion, in which dishes from Mexican fajitas to Indian curries and Japanese ramen form part of the everyday diet.

> *"The eclectic spice palette of contemporary North America reflects the diverse migration that defines the region."*

LOCAL SPICE BLEND

BBQ rub

A dry spice blend for barbecued meat, with many regional variations. This recipe takes brown sugar from Kansas City and paprika from the Memphis rub.

- **1 tbsp** ground cumin
- **1 tbsp** chili powder
- **1 tbsp** ground black pepper
- **1 tbsp** onion powder
- **1 tbsp** garlic powder
- **½ tbsp** cayenne pepper
- **3 tbsp** brown sugar
- **2 tbsp** smoked paprika
- **2 tbsp** sea salt

Mix together all of the ingredients to create a dry rub for barbecued meat, from steak or brisket to pulled pork and chicken wings.

***Aji limo** is a hot chili with a strong lemony flavor, although it takes its name from the Lima region.*

Ceviche of raw white fish marinated in *leche de tigre*. ➤

LOCAL SPICE BLEND

Leche de tigre

Translating as "tiger's milk," this is the marinating liquid for ceviche, the raw fish dish originally from Peru and now enjoyed all along the Pacific coast.

½–1 *ají limo*, habanero, or other hot chili, finely chopped
1 large garlic clove, crushed
1 in (2.5 cm) piece of ginger, coarsely grated
1 tbsp fresh cilantro stalks, finely chopped
½ small red onion, finely chopped
juice of **5** limes
salt, to taste

Combine all the ingredients and refrigerate for 1 hour before using to marinate fresh white fish. *Leche de tigre* is traditionally drunk after the fish has been eaten.

PACIFIC SOUTH AMERICA

Fresh | Spicy | Citrus

From the Gulf of Panama to the tip of Patagonia, the vast coastline of South America naturally draws from its waters for sustenance: all manner of seafood is fried, grilled, or stewed. Indigenous culture, Spanish colonization, the slave trade, and Asian and Arab migrations have all influenced dishes, from delicate chili and coconut fish soups to hearty *charquicán* (beef and vegetable stew). Chilis are key to the spice mix, often used fresh in ceviche, while dishes in the Nikkei tradition—a fusion of Japanese and Peruvian cooking—draw on flavorings such as ginger, sesame, tamarind, and *umeboshi* (pickled plum) paste.

SPICE PALETTE

Signature

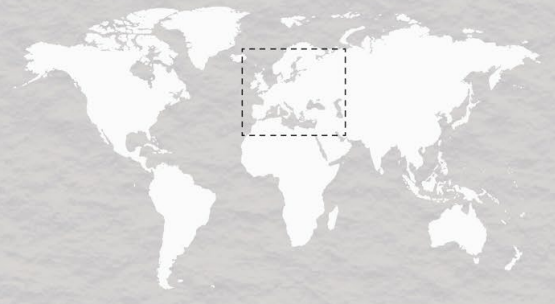
Chili (*ají limo*, *panca*, *chombo*), garlic, cilantro stalks
Chilis, usually used fresh, are extremely prevalent and add zip to seafood dishes, while cilantro stalks bring a slightly floral flavor.

Supporting

Cumin, chili powder, ginger, fresh lime, turmeric
Cumin is used as a seasoning, while chili powder provides a milder alternative to fiery whole chilis. Fresh, clean ingredients, such as ginger and lime, are added to soups and stews.

Supplementary

Annatto, sesame, tamarind
Tangy tamarind adds both sweet and sour touches, sesame lends a nutty richness, and annatto's bright red hue colors soups and stews.



World of Spice

EUROPE

Despite the diversity of European cuisine, the continent has few native spices. Almost everything used across the region was introduced via the global spice trade, the legacy of which is that European spice palettes are broadly similar—though interesting regional variations still occur.

SPICE REGIONS

- ***Scandinavia*** p.72
- ***Great Britain*** p.73
- ***France*** p.74
- ***Spain and Portugal*** p.75
- ***Italy*** p.76
- ***Southeast Europe*** p.77

SWEDEN
CARAWAY
Finnish caraway is rich in essential oils, making it highly sought-after.
FINLAND
NORWAY
Oslo
Ribe
Spices reached Scandinavia in the 9th century, via Viking trading cities such as Ribe.
City built on spice
Venice's location meant that in medieval times, most of the black pepper destined for Europe passed through the city. Venetian merchants controlled Europe's pepper trade, and consequently the city became extremely wealthy and powerful.
Amsterdam
The 17th century was Amsterdam's Golden Age—its wealth was based on domination of the world's spice trade.
Bruges
JUNIPER
Italian wild juniper is especially prized by gin makers.
PAPRIKA
Strings of drying peppers festoon houses and gardens in Hungary.
HUNGARY
BLUE FENUGREEK
This aromatic spice grows wild in mountainous northern Georgia.
GEORGIA
Venice
ITALY
Istanbul
GREECE
MASTIC
The Greek island of Chios is the main source of the world's mastic.
Genoa
Genoa used its spice-trade wealth to become a powerful and rich city-state.
Rome
The heart of the Roman Empire, Rome was the western end point of the ancient Silk Road.
CYPRUS
Alexandria
KEY
Historical spice trade routes
Ancient Silk Road

SPICE PALETTE

Signature

Cardamom, cinnamon, caraway, dill, nutmeg
Cardamom is king, although cinnamon runs a close second, while caraway is more popular in Finland. Dill seeds are common in pickling solutions.

Supporting

Ground ginger, clove, allspice, licorice, mustard, saffron, juniper
Ginger, cloves, and allspice are used more for seasonal sweet baking, although allspice is also paired with pickled herring and pork. Salty licorice is a unique Scandinavian treat.

Supplementary

Angelica, bitter orange powder, dried rosehips, fennel
Angelica and powdered orange peel are common in Finland—the latter is added to cookies, cakes, and the traditional Easter dessert, *mämmi*. Rosehips are used to flavor jelly, jams, oil, and tea.

SCANDINAVIA

Sweet | Earthy | Aromatic

The clean, refined fare of the Nordic countries has some of the most distinctive spicing in all of Europe. Most notable is the use of cardamom, supposedly brought north by the Vikings from Constantinople 1,000 years ago. Danish pastries and other Nordic baking would be lost without the festive flavors of cinnamon, cloves, ginger, and allspice. The region's love of pickling and preserving sees a profusion of aromatics such as dill seed and the native juniper, which also appears with game and in Finland's *sahti* beer. Brown mustard is common both as a condiment and as a whole spice.

LOCAL SPICE BLEND

Finnish gingerbread spice

A fragrant, warming spice mix and the perfect base for the classic Finnish gingerbread known as *piparkakut*.

1 tbsp bitter orange powder
2 tsp ground cloves
2 tsp ground ginger
2 tsp ground cinnamon
1 tsp ground cardamom

Simply mix all the ingredients together. Makes enough to flavor the dough for around 30 cookies.

▲ Cookie shapes cut from Finnish *piparkakut* dough, see p.213.

***Bitter orange powder** is made from the dried peel of Seville oranges, and imparts a sour citrus flavor.*

BRITAIN

Warming | Gutsy | Festive

One of the culinary legacies of the British Empire is a taste for South Asian spicing, often amalgamated into all-purpose curry powders. These are used liberally in the eponymous national dish, as well as a gravylike sauce for French fries, the vegetable preserve known as piccalilli, and the summer buffet staple Coronation chicken. Dating further back to Britain's medieval past is a love of warming aromatic spices for flavoring sweet pastries and alcoholic drinks consumed in the cold winter months; to a Brit, cloves, cinnamon, nutmeg, ginger, and mace are all immediately evocative of the festive season.

LOCAL SPICE BLEND

Mulling spice

Warm red wine or cider is infused with this collection of whole sweet spices and traditionally drunk at winter celebrations, from Bonfire Night to orchard wassails on Twelfth Night.

2 cinnamon sticks
6 cloves
6 allspice berries
½ nutmeg
2 bay leaves

Add the spices to a pan of red wine or cider, or tie them up first in a piece of muslin for easy retrieval, and heat to simmering point. Add sugar or honey, orange and/or lemon slices, and rum or sloe gin to taste. Enough for two bottles of red wine or 3 pints (1.75 liters) of still cider.

SPICE PALETTE

Signature

Curry powder, allspice, clove, cinnamon
Curry powder is a mix of spices including fenugreek, turmeric, ginger, and cumin. Allspice is used in a myriad of sweet dishes and also in salted beef.

Supporting

Mustard, cayenne pepper, nutmeg, mace, ginger, juniper
Potent English mustard is an essential accompaniment to cooked meats, fiery cayenne is used in devilled kidneys, and juniper is most often used in game dishes.

Supplementary

Saffron, white pepper, coriander, anise, turmeric
Historically saffron and white pepper were popular, but their traditional use has largely dwindled to Cornish buns and preserved meats, respectively. In addition to use in pickling spice, coriander seeds flavor Lancastrian Goosnargh cakes.

SPICE PALETTE

Signature

Garlic, mustard, fennel, nutmeg
French cooking and garlic are utterly inseparable. Whether smoked, fresh, or green, for many it is the defining taste of Gallic food.

Supporting

Caraway, vanilla, anise, white pepper, juniper, saffron
White pepper is essential to the *quatre épices* mix, and you'll find juniper used in Alpine regions, and saffron for the southern fish stew *bouillabaisse*. Caraway, vanilla, and anise flavor creams and cakes.

Supplementary

Angelica, tonka bean, clove, mace
The French kitchen utilizes a number of more unusual spices: angelica stalk is added to candies and *digestif* liqueurs, while the powerful tonka bean is infused into creams and custards.

FRANCE

Pungent | Fragrant | Comforting

France doesn't immediately spring to mind as a country with a spice-rich cuisine, yet the word itself is derived from Old French *espice* (meaning "seasoning"), and it was the 18th-century French botanist Pierre Poivre who broke the Dutch stranglehold on clove and nutmeg with smuggling raids to the Moluccas Spice Islands. Indeed, it's hard to imagine a classic Dauphinoise potato without the warmth of nutmeg, Provençal cookery without the aniseedy notes of fennel, or innumerable French dishes without garlic or Dijon and Bordeaux mustards.

> *"French cooking tends to draw heat from garlic and pepper, but chilis feature in Basque and Provençal dishes."*

LOCAL SPICE BLEND

Quatre épices

This "four spices" mix is often used to season terrines. Proportions can be tweaked and, confusingly, cinnamon added as a fifth spice.

1 tbsp white peppercorns
1 tsp cloves
1 tsp ground nutmeg
1 tsp ground ginger

Grind the whole spices and combine with the nutmeg and ginger. To make a mix for sweet pastries, replace the white pepper with allspice or cinnamon.

LOCAL SPICE BLEND

Paella mix

Saffron and *pimentón* are essential to the flavor of paella, Spain's versatile rice-based dish.

2 pinches of saffron
3 tbsp *pimentón* (a mixture of smoked and sweet)
2 tsp garlic powder
2 tsp onion powder
1 tsp cayenne pepper
1 tsp ground black pepper
1 tsp dried oregano
½ tsp dried parsley
½ tsp ground cloves
½ tsp ground cumin

Grind the saffron threads using a pestle and mortar, and combine with the remaining ingredients. Makes approximately 6 tablespoons.

SPAIN AND PORTUGAL

Smoky | Sweet | Piquant

***Arab conquerors** from North Africa first introduced saffron cultivation to the Iberian peninsula in the 8th century.*

Brought back from the Americas by Columbus in the late 1400s, sweet and chili peppers are inescapable in this region. Spanish cooks often reach for the mildness of *pimentón*, while the Portuguese brave the heat of malagueta chilis. Dried nora peppers are essential to the Catalan romesco sauce for fish, and green *guindilla* chilis are used in a hot sauce from the Canaries. Saffron abounds in Andalusian cuisine and the Valencian classic, paella, while cinnamon laces sweet Portuguese dishes.

Spice mix and ingredients ready for paella, see p.213.

SPICE PALETTE

pimentón

piri piri chili

Signature

***Pimentón*, chili (malagueta)**
Spain's vivid red *pimentón* (paprika) comes in three varieties: *dulce* (sweet), *agridulce* (bittersweet), and *ahumado* (smoked). Hot malagueta chilis are popular in Portuguese stews and other meat dishes.

Supporting

***Pimentón picante*, dried nora peppers, chili (piri piri), garlic, saffron**
Pungent *pimentón picante* is less popular than its milder variants, but makes a regular appearance in the Canaries and Galicia. Piri piri is used interchangeably with malagueta in Portugal.

Supplementary

Dried choricero peppers, chili (*guindilla*, *alegrías*), cacao, anise, cloves, cinnamon
Cacao nibs are occasionally used in game and beef stews. Fragrant anise is paired with chestnuts in Portugal and with dried figs in Catalonia.

SPICE PALETTE

Signature

Chili (*peperoncino*), black pepper, fennel

Hot peppers have long been popular in southern Italy, although their appeal is increasingly spreading north. More than anywhere else in Europe, black pepper transcends being a mere seasoning in Italy.

Supporting

Coriander, nutmeg, garlic, saffron, clove, vanilla

Coriander seeds are a popular flavoring for meat dishes, and it can seem as if almost every Italian cheese dish features nutmeg.

Supplementary

Ginger, cacao, licorice, cinnamon, anise

Ginger is used sparingly, while cacao nibs may feature in the sweet and sour *agrodolce* sauce. Calabrians pair licorice with game and also use it to flavor liqueurs.

➤ Penne pasta with *arrabiata* sauce, Parmesan, and fresh basil.

ITALY

Punchy | Rustic | Warming

Italy played a key role in the story of spice when the Republic of Venice dominated the trade from the 8th to 15th centuries. Today, varied regional palettes reflect Italy's history as a collection of separate states, but fennel, nutmeg, and saffron are popular countrywide for flavoring meats, cheeses, pasta dishes, and risottos. The fiery food of Calabria uses the hot *peperoncino* chili to spice cheese, salami, and oil. Cloves, too, are prevalent both in sweet dishes—the compact Sienese *panforte* tart, for instance—and in rustic savory ones.

LOCAL SPICE BLEND

Arrabiata sauce

Translating as "angry," this quick pasta sauce gets its fiery reputation from liberal quantities of chili and black pepper.

1 tbsp hot red chili flakes
1 tsp dried oregano
1 tsp garlic powder
1 tsp salt
1 tsp ground black pepper
1 tbsp olive oil
1¾oz (50g) cubed pancetta
1 onion, finely chopped
2 (14.5oz) cans chopped tomatoes

Combine the first five ingredients and set aside. Heat the oil and fry the pancetta and onion for 5 minutes. Add the spice mix and tomatoes, and simmer for 10 minutes. Serve with penne pasta.

Peverino is a peppery cookie from Venice dating from the city's heyday as the European center of the spice trade.

SOUTHEAST EUROPE

Unusual | Earthy | Generous

The food of these eastern Mediterranean and former communist states is far from spice heavy, and Greek food in particular tends to favor herbal flavoring. That said, Hungarian paprika (introduced by the Turks in the 17th century), and Georgian blue fenugreek represent two of Europe's most distinctive flavors. Chilis appear often in Balkan cooking, but rarely for heat; what warmth there is tends to come from black pepper. Caraway is often paired with cabbage in Hungary and occasionally with fish in the Balkans, and cinnamon is popular in Romania. The food of Cyprus is often laced with coriander seeds and, unusually, pinelike mastic.

LOCAL SPICE BLEND

Khmeli-suneli

Universally popular in Georgia, *khmeli-suneli* is used as a meat rub or in hearty stews, although it is highly palatable sprinkled on almost anything.

- **1 tbsp** coriander seeds
- **1 tsp** black peppercorns
- **2** dried bay leaves
- **1 tbsp** blue fenugreek leaves
- **1 tbsp** blue fenugreek seeds
- **1 tsp** garlic powder
- **½ tsp** chili powder
- **2 tbsp** dried marigold
- **2 tbsp** dried savory
- **2 tbsp** dried marjoram
- **1 tbsp** dried mint
- **1 tbsp** dried dill
- **1 tsp** dried hyssop

Grind the whole spices and combine with the rest of the ingredients.

SPICE PALETTE

Signature

Blue fenugreek, black pepper, paprika

Blue fenugreek, almost exclusively used in Georgian cuisine, tastes a little like hay and burned sugar. Both seeds and pods are ground to a powder.

Supporting

Cinnamon, caraway, fennel, chili

As well as providing the warm spice notes of Greek moussaka, cinnamon features heavily in Romanian cookery, which is otherwise spice light. Caraway is sometimes added to the Greek orange-flavored *loukaniko* sausage.

Supplementary

Dill, carob, vanilla, mastic

Dill seeds are often paired with fish in Eastern Europe. Carob is popular as an alternative to chocolate, and is used in Greek carob cake; Hungarian creams and cakes are often infused with vanilla.

FLAVOR GROUPS

Sweet Warming Phenols 80
Warming Terpenes 102
Fragrant Terpenes 116
Earthy Terpenes 126
Penetrating Terpenes 130
Citrus Terpenes 142
Sweet-Sour Acids 148
Fruity Aldehydes 160
Toasty Pyrazines 164
Sulfurous Compounds 172
Pungent Compounds 180
Unique Compounds 194

RECIPES

Chinese Steamed Salmon with Chili and Star Anise 92
Chicken and Eggplant Biryani with Seven-Spice 104
Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
West African Peanut Curry with Durban Masala 124
Asian Larb Salad with Curried Duck and Khao Kua 140
Date and Tamarind Granita with Caramelized Pineapple 156
Black Sesame, Licorice, and Cardamom Ice Cream 170
Sweet and Spicy Apple Pastry Rosettes 182
Spiced Scallops with Saffron Beurre Blanc 196
Spiced Filipino Adobo with Chicken and Pork 208

SPICE | *profiles*

Discover all you need to know about the world's top spices with in-depth science and practical advice, and begin your culinary adventure with innovative recipes.

CINNAMON

Sweet | Aromatic | Warm

BOTANICAL NAME
Cinnamomum verum

ALSO KNOWN AS
Ceylon cinnamon, "true" cinnamon

MAJOR FLAVOR COMPOUND
Cinnamaldehyde

PARTS USED
Dried bark of tender shoots

METHOD OF CULTIVATION
Trees are coppiced at 18–24 months of age and the stump covered, causing it to grow like a bush. New shoots are removed at the base and stripped for their bark.

COMMERCIAL PREPARATION
Inner layers of bark are dried in the sun and rolled together by hand into long "quills," which are graded and cut.

NON-CULINARY USES
In perfumery and as a natural antiseptic.

The plant
Cinnamon is a small evergreen tree in the laurel family, found in the wild growing in wet tropical forests.

Young shoots *are harvested for their bark every two years*

Powder
Ground spice quickly loses its flavor. Buy it in small quantities, keep in an airtight container in a cool, dark place, and use within 6 months.

Whole
Cinnamon sticks will keep their flavor for up to a year. Lighter brown, thinner, more fragile sticks are higher quality.

Spice story

From 1600 BCE, ancient Egyptians used a type of cinnamon for incense and as an embalming spice, importing it from Asia via African traders. It is not known for certain whether this was cinnamon from Sri Lanka or Chinese cassia. From the 8th century CE, Arab merchants dominated the trade and invented tall tales to protect their sources and high prices. In one such myth, giant birds were said to gather the bark from an unknown land, using it to make nests on high cliffs, and the only way to collect it was to lure the birds away with large pieces of meat. The real source remained a mystery to Europeans until the Portuguese found cinnamon trees growing in Sri Lanka in the early 1500s, and promptly occupied the island. They in turn were ousted by the Dutch, who then fought the British for centuries over control of the territory and lucrative trade.

Region of cultivation
Cinnamon is native to the island of Sri Lanka and is now also notably cultivated in Myanmar, Vietnam, Indonesia, and the islands of the Seychelles off the coast of East Africa.

Kitchen creativity

Cinnamon does not in itself taste sweet, but rather it enhances the perception of sweetness in other ingredients. This makes it perfect for sweet pastries and desserts, and for drawing out sweet notes in savory dishes.

BLENDING SCIENCE

Cinnamaldehyde is the main flavor compound and is sensed by temperature receptors on the tongue, giving cinnamon a warming quality that makes it a good partner for other warming spices. Make further connections through the woodiness of caryophyllene, the penetrating aroma of eugenol, and the floral notes of linalool.

CARYOPHYLLENE
spicy / woody / dry

CINNAMALDEHYDE
warming / spicy / pungent

LINALOOL
floral / woody / spicy

EUGENOL
medicinal / woody / warming

enhance woody notes with caryophyllenes:

⊕ **allspice** also shares eugenol, for warming spiciness

⊕ **peppercorn** adds pungent heat from piperine

add depth with an earthier warming compound:

⊕ **cumin** contributes the equally warming and tenacious cuminaldehyde

draw out the floral side with another linalool:

⊕ **cardamom** brings complex citrus-floral and penetrating eucalyptus aromas

pair with other eugenols for clean, penetrating aromas:

⊕ **clove** also shares caryophyllene and should be used sparingly

⊕ **anise** and **star anise** will enhance the sweetening effect of cinnamon and add licorice notes

FOOD PARTNERS

⊕ **Fruit** Mix cinnamon powder with sugar and sprinkle over peaches, figs, apples, and pears before baking or grilling, or add to the batter for a plum or cherry clafoutis.

⊕ **Sweet baked goods** Use ground cinnamon to flavor Nordic buns, Italian *panforte*, or French *pain d'épices*.

⊕ **Tomatoes and eggplants** A cinnamon-infused tomato sauce makes an excellent topping for baked eggplants.

⊕ **Red meats** Add a stick or two to a lamb tagine, an Iranian *khorak* beef stew, or the stock of a fragrant Vietnamese beef *pho* noodle soup.

⊕ **Pigeon** Cinnamon is the main flavoring in Moroccan *pastilla* pigeon pie with phyllo pastry.

BLENDS TO TRY

Use and adapt these recipes for classic blends featuring cinnamon:

Advieh p.27
Burmese garam masala p.48
Jamaican jerk rub p.64
Mole mix p.65
Mulling spice p.73

RELEASE THE FLAVOR

The taste components in cinnamon need time to escape from its woody matrix, and the critical flavor compound, cinnamaldehyde, does not dissolve in water.

Add early in cooking to give flavors time to suffuse the dish.

Fat and alcohol will help disperse cinnamaldehyde.

Steam is also a carrier of cinnamaldehyde, so boil vigorously with a lid on the pan.

CASSIA

Sweet | Peppery | Astringent

BOTANICAL NAME
Cinnamomum cassia, *C. loureirii*, *C. burmannii*

ALSO KNOWN AS
Chinese cinnamon (*C. cassia*), Vietnamese/Saigon cinnamon (*C. loureirii*), Indonesian/Java/Korintje cinnamon (*C. burmannii*)

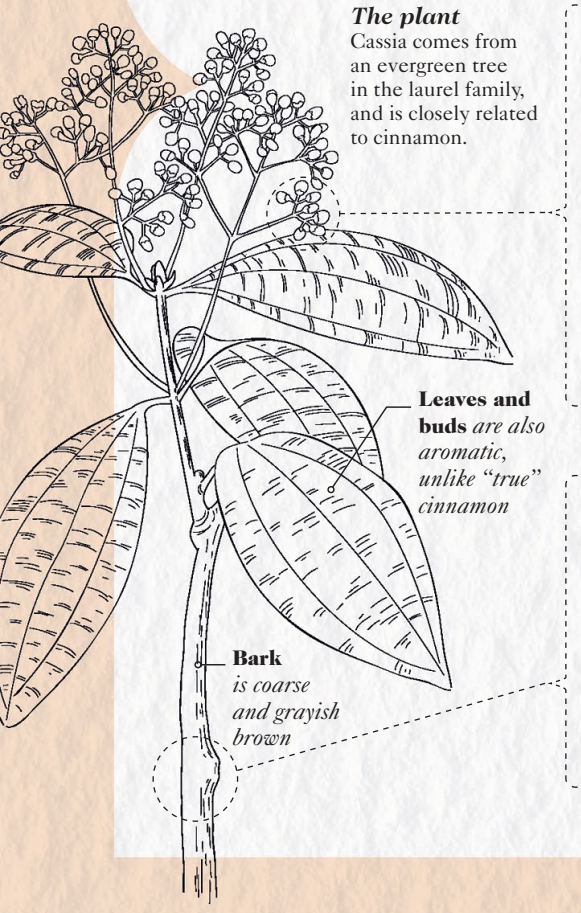
MAJOR FLAVOR COMPOUND
Cinnamaldehyde

PARTS USED
Dried bark, unripe fruits ("buds")

METHOD OF CULTIVATION
The bark is harvested every second year in the monsoon season from trees that are at least four years old.

COMMERCIAL PREPARATION
Strips of inner bark are dried in the sun a nd curl up naturally, forming thick shards; buds are dried.

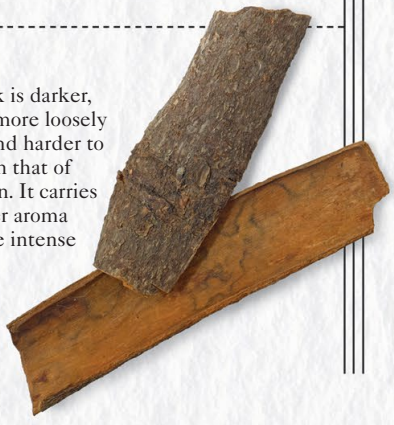
NON-CULINARY USES
In perfumes; in Chinese medicine to treat diarrhea and dyspepsia.



The plant
Cassia comes from an evergreen tree in the laurel family, and is closely related to cinnamon.

Buds
The dried unripe fruits resemble cloves and are used in the Far East as a pickling spice.

Bark
The bark is darker, thicker, more loosely coiled, and harder to snap than that of cinnamon. It carries a stronger aroma and more intense flavour.



Spice story

Cassia was used for medicinal purposes in ancient China from 2700 BCE, and was among the first spices to reach the Mediterranean via the ancient trade routes. The Egyptians used cinnamon as a culinary spice and for its health properties, but it is unclear whether they used cinnamon or cassia. Persians knew cassia and cinnamon as *darchini*, and used them in savory and sweet dishes. By the 5th century BCE, cassia had been identified as distinct from cinnamon. Medieval English and French cookbooks referred to cassia and cinnamon as "canella," but cassia's coarser flavor saw its status demoted: in his 15th-century book of manners, *Bok of Nurture*, John Russell wrote that "Synamone is for lords, canelle for common people." Today, cassia accounts for nearly 50 percent of the world's cinnamon supply, and is a key spice in China and Southeast Asia. It is popular in North America, where most "ground cinnamon" is actually cassia.

Region of cultivation
Cassia is native to the wet tropical forests of southern China. It is cultivated across southern and eastern Asia, but mainly in southern China and Vietnam.

Kitchen creativity

Cassia has a sweet, warming taste, but is bitter and lacks the floral, citrus notes of cinnamon. Its deeper, spicier, less subtle flavor is best suited to robustly flavored savory dishes, although the spice can be used in sweet baking.

BLENDING SCIENCE

Cassia's flavor profile is dominated by cinnamaldehyde, the compound that gives cinnamon and cassia their recognisable taste. Tannins, which give a mouth-puckering astringency, are also present and it contains coumarin, a phenol absent in "true" cinnamon, as well as eucalyptus-scented cineole.

CINNAMALDEHYDE
warming / sweet-spicy / cinnamon-like

COUMARIN
sweet / warming / grassy

CINEOLE
penetrating / eucalyptus / fresh

pair with other earthy, bitter, and/or gently warming spices:

- ⊕ **carob** is sweet, earthy and contains cinnamaldehyde
- ⊕ **cumin** contributes an earthy, slightly bitter warmth
- ⊕ **star anise** adds herbal, earthy, and floral notes, and an undercurrent of licorice
- ⊕ **ginger** brings pungent warmth and sweet citrus notes

combine with other sweet spices for a broader profile:

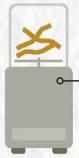
- ⊕ **mahleb** shares coumarin and gives an almond flavor
- ⊕ **nutmeg** is a star match, adding bittersweet woodiness
- ⊕ **vanilla** is honey sweet and slightly nutty
- ⊕ **anise** intensifies sweetness and adds herby notes

pair with cineole-flavored spices to enhance eucalyptus nuances:

- ⊕ **cardamom** adds a sweet minty background
- ⊕ **bay** is rich in cineole and introduces a complex, piney, and floral freshness
- ⊕ **allspice** provides a sweet peppery warmth
- ⊕ **grains of Selim** has a medicinal flavor and adds pine, floral, and woody notes

RELEASE THE FLAVOR

Most flavor compounds in cassia, including dominant cinnamaldehyde, do not dissolve in water and can struggle to escape from woody bark's matrix.



Cassia bark is best ground in an electric grinder

Grind cassia just before use to minimize the loss of flavor oils by evaporation.

Include fats and/or alcohol in a dish to help disperse flavor compounds.

Steam disperses cinnamaldehyde, and a water-based dish can be infused with flavor if boiled in a lidded pot.

FOOD PARTNERS

- ⊕ **Beef, pork** Include a piece of cassia bark with other warming spices in an Italian beef or oxtail ragu, beef rendang, or pork vindaloo.
- ⊕ **Pulses, grains** Add a piece of cassia bark to the base aromatic ingredients for a pilaf, dhal, or curry.
- ⊕ **Baking** Create the unmistakable aroma of American iced cinnamon rolls by using ground bark; add ground buds to Christmas confections, fruit cake, and spiced cookie dough.
- ⊕ **Preserves** Infuse cucumber pickling brine, tomato chutney, or a barbecue sauce with cassia buds.

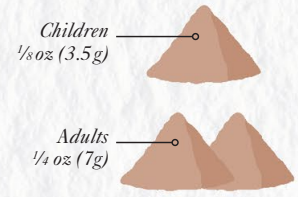
BLEND TO TRY

Use and adapt this classic blend featuring cassia:

Garam masala p.40

Coumarin caution

Sweet-tasting coumarin can cause temporary liver damage if consumed in excessive amounts. Regular consumers of cinnamon-flavored foods should therefore choose "true cinnamon" rather than cassia.



Medical authorities have recommended maximum weekly quantities of cassia, above which it should not be consumed for a long period.

CLOVE

Sweet | Astringent | Camphorous

BOTANICAL NAME
Syzygium aromaticum

ALSO KNOWN AS
Nail spice: the common name in many languages translates as "nail spice" due to its shape.

MAJOR FLAVOR COMPOUND
Eugenol

PARTS USED
Flower bud

METHOD OF CULTIVATION
Twice a year, the flower buds are picked by hand when they have just turned pinky-red and are almost ready to open.

COMMERCIAL PREPARATION
The buds are dried in the sun until they turn dark brown and harden.

NON-CULINARY USES
To flavor *kretek* cigarettes in Indonesia; in some dental products; and to treat nausea, indigestion, and inflammation.

Unpicked buds *develop into crimson flowers with a creamy froth of stamens*

Glossy, bay-like leaves *are also aromatic*

The plant
The clove tree is a tropical evergreen, which flourishes in volcanic, loamy soil. Flowers are produced after five years, but the tree can remain productive for 100 years.

Round tops *are the unopened petals of the flower*

Whole
Look for cloves that are plump, not shriveled or broken, and where the majority retain their rounded tops. Test for quality by pressing the "stem" with a fingernail: oil should ooze out.

Powder
Ground cloves quickly lose their flavor, and it is better to buy whole cloves and grind as required. Twelve whole cloves are roughly equivalent to a teaspoon of ground.

Spice story

The Moluccas (now Maluku) of Indonesia were once renowned as the Spice Islands thanks to a trio of indigenous spices—cloves, nutmeg, and mace—which were cultivated there, and nowhere else, for almost two millennia. Courtiers addressing the Emperor during the Chinese Hang dynasty (206 BCE–220 CE) used cloves to sweeten their breath, and the Romans, who named the spice *clavus* (Latin for nail), used it as an incense and perfume. In the Middle Ages, clove took off as a culinary spice in the West. At first the Republic of Venice had a virtual monopoly of the lucrative trade, but the Portuguese, Dutch, Spanish, and English fought a series of wars to seize control, with the Dutch eventually winning out. In the 18th century, Frenchman Pierre Poivre managed to smuggle clove seedlings to Mauritius.

Region of cultivation
Indonesia is still the largest producer of cloves, although most of the crop is used by the local *kretek* cigarette industry. Other major producers are Madagascar and Tanzania, with lesser amounts from India, Sri Lanka and Pakistan.

Kitchen creativity

Clove's powerful flavor is usually tamed by blending it with other similarly warming spices to soften its dominance. Antiseptic properties make it a common spice for pickling, but use sparingly.

BLENDING SCIENCE

Clove has the highest eugenol content of any spice; this perfumed, warming phenol compound has a eucalyptus-like scent and a sweetening effect on the tongue. Woody caryophyllene is the other compound useful for pairing, and the flavor profile is rounded off with green banana–like methyl amylketone and minty methyl salicylate.

EUGENOL
medicinal / woody / warming

CARYOPHYLLENE
woody / spicy / bitter

pair with other warming spices that contain some eugenol:

- ⊕ **allspice** provides a sweet, peppery warmth
- ⊕ **licorice** contributes sweetness and eucalyptus-like notes
- ⊕ **nutmeg** or **cinnamon** used sparingly add warm spicy notes
- ⊕ **bay leaf** and **fenugreek** offer excellent savory pairings

draw out the spicier side with more caryophyllene-carrying spices:

- ⊕ **grains of paradise** bring a peppery warmth and penetrating spiciness
- ⊕ **black pepper** lends warmth as well as woody notes
- ⊕ **cacao** adds rich, roasted, bitter flavors

FOOD PARTNERS

- ⊕ **Tomatoes and red cabbage** Add a pinch to tomato sauce or when braising red cabbage.
- ⊕ **Peaches** The fruit shares eugenol, making it a natural partner. Preserve in a sugar syrup infused with cinnamon, fresh ginger, and whole cloves (2–3 per peach).
- ⊕ **Beef and pork** Season a beef stew, pork braise, or classic French *pot-au-feu* with a few whole cloves, or use them in the masala for a Keralan beef curry.
- ⊕ **Milk** Add a clove or two to milk before scalding it to make a white sauce or an Indian *kheer* or *payasam* pudding.
- ⊕ **Hot drinks** Infuse tea or coffee with a whole clove for sweetness without the calories. Cloves are also an essential aromatic in mulled wine or cider.

BLENDS TO TRY

Try these recipes for classic blends featuring clove, or why not adapt them with some blending science?

Pilau masala p.34
Vindaloo paste p.44
Finnish gingerbread spice p.72

RELEASE THE FLAVOR

Clove's main flavor compounds, eugenol and caryophyllene, are oil based. They evaporate very quickly once released, and barely dissolve in water.

Use whole cloves or grind just before adding to the recipe.

Add early to give ample time for the flavor to diffuse out of the woody matrix.

Some oil/fat and/or alcohol is needed to distribute the flavor compounds.

ALLSPICE

Warm | Peppery | Sweet

BOTANICAL NAME
Pimenta dioica

ALSO KNOWN AS
Jamaican pepper, clove pepper, pimento

MAJOR FLAVOR COMPOUND
Eugenol

PARTS USED
Dried berries; occasionally fresh leaves

METHOD OF CULTIVATION
Twigs bearing bunches of berries are handpicked from trees in summer, when the berries are mature but still green.

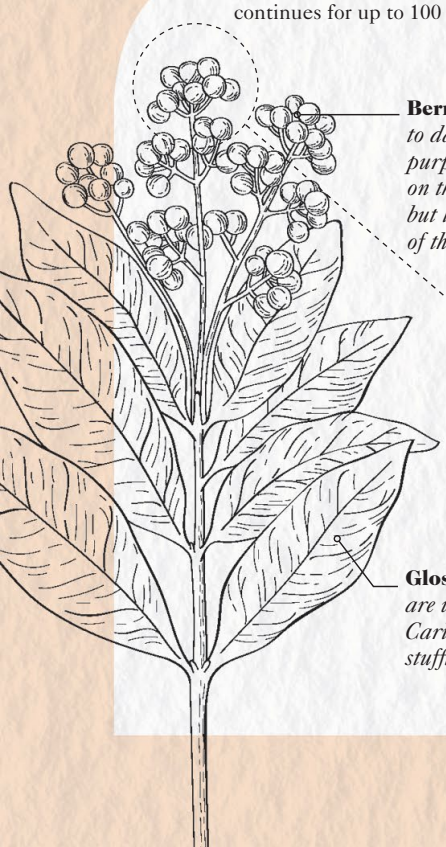
COMMERCIAL PREPARATION
Berries are "sweated" (see vanilla curing, p.100) and then dried for several days in the sun, or artificially, before being picked.

NON-CULINARY USES
Essential oil in perfumes and cosmetics; flavoring agent in medicines; pesticide and fungicide; antiseptic and digestive aid.

Spice story

The Mayans of Central America were using allspice from at least 2000 BCE to embalm their dead, alleviate arthritis, and flavor chocolate beverages, while the indigenous peoples of the Caribbean used it to preserve meat and fish. Christopher Columbus was the first European to encounter the spice, in Jamaica in 1494, but mistook it for a variety of pepper, hence its Spanish name *pimento*. From the outset, Europeans were enamored of its preservative powers, and the spice is used as a preservative in the Scandinavian fishing industry to this day. When Russia was invaded by Napoleon in the early 19th century, the Russian troops crushed allspice berries inside their boots to ward off bacterial and fungal foot infections.

The plant
Allspice is an evergreen tree in the myrtle family. It starts fruiting by the age of 7 or 8 years, and continues for up to 100 years.



Powder
Ground allspice quickly loses its potency. Buy in small quantities and keep sealed in a cool, dark place for up to 6 months.

Whole
The dried berries retain their flavor well and will keep almost indefinitely sealed in a cool, dark place.

Region of cultivation
Native to the West Indies, Mexico, and Central America, allspice is mainly cultivated in Jamaica, but also in Honduras, Mexico, Guatemala, Hawaii, and Tonga.

Kitchen creativity

True to its name, this full-bodied, versatile spice suits both sweet and savory dishes, and blends comfortably with other spices. Allspice forms the backbone of Jamaican cuisine and is a key component of jerk seasoning.

BLENDING SCIENCE

Allspice pairs with other spices that share the phenolic compound eugenol, which carries a strongly medicinal aroma. Other cineole-bearing spices with a eucalyptus-like, penetrating quality also pair well. Lesser amounts of the lighter terpenes phellandrene, linalool, myrcene, and pinene round off the taste profile.

EUGENOL
medicinal / woody / warming

CINEOLE
eucalyptus / medicinal / penetrating

PHELLANDRENE
peppery / mint / mildly citrus

LINALOOL
floral / woody / spicy

bring more complexity to the eugenol spectrum:

- ⊕ **nutmeg** and **cinnamon** will draw out warmer notes
- ⊕ **licorice** emphasizes sweetly medicinal flavors
- ⊕ **bay** has a fresher, floral take on eugenol

combine with other cineoles to reinforce the sharp, fresh notes:

- ⊕ **galangal** will provide a citrusy edge
- ⊕ **cardamom** brings a penetrating warmth
- ⊕ **black cardamom** adds a smoky layer under the eucalyptus

give a boost to the peppery profile:

- ⊕ **star anise** also shares cineole for sweet aniseed piquancy
- ⊕ **black pepper** contributes a gentle pungent heat

tap into the fragrant floral side with other linalools:

- ⊕ **coriander** also adds zesty citrus notes
- ⊕ **grains of Selim** also share cineole and enhance on the peppery side of allspice

FOOD PARTNERS

- ⊕ **Raw fish** Combine with mustard seeds as a pickling spice for raw fish, such as herring, or in Mexican *escabeche*.
- ⊕ **Sweet vegetables** To bring out the natural sweetness in vegetables, try it in a tomato sauce or soup, a beet *borscht*, or puréed sweet potato.
- ⊕ **Red meats** Stir ground spice into beef stews (particularly tomato-based) and pork or game pâté mixtures.
- ⊕ **Stone fruit and rhubarb** Sprinkle a pinch of ground allspice into the pan when poaching plums, apples, pears, or rhubarb.
- ⊕ **Sweet baked goods** Add a pinch to biscuit dough, ginger cake, milk puddings, or steam puddings.

BLENDS TO TRY

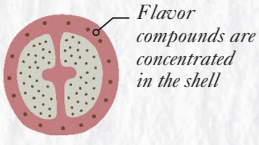
Try these recipes for classic blends featuring allspice, or why not adapt them with some blending science?

Arabic baharat p.26
Jamaican jerk rub p.64
Mulling spice p.73

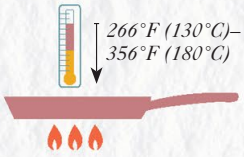
RELEASE THE FLAVOR

Extra layers of smoky, roasted aromas from pyrazines can be created by cracking and toasting the whole spice before grinding.

Before toasting, crush the berries lightly in a pestle and mortar to crack the shells.



Cracking the shells helps to release the flavor oils, which are stored in tiny glands.



Toast in a dry frying pan. New flavor compounds, such as pyrazines, form above 266°F (130°C), but at 356°F (180°C) burned flavors dominate.

ANISE

Camphorous | Sweet | Warming

BOTANICAL NAME
Pimpinella anisum

ALSO KNOWN AS
Aniseed, sweet cumin, white anise

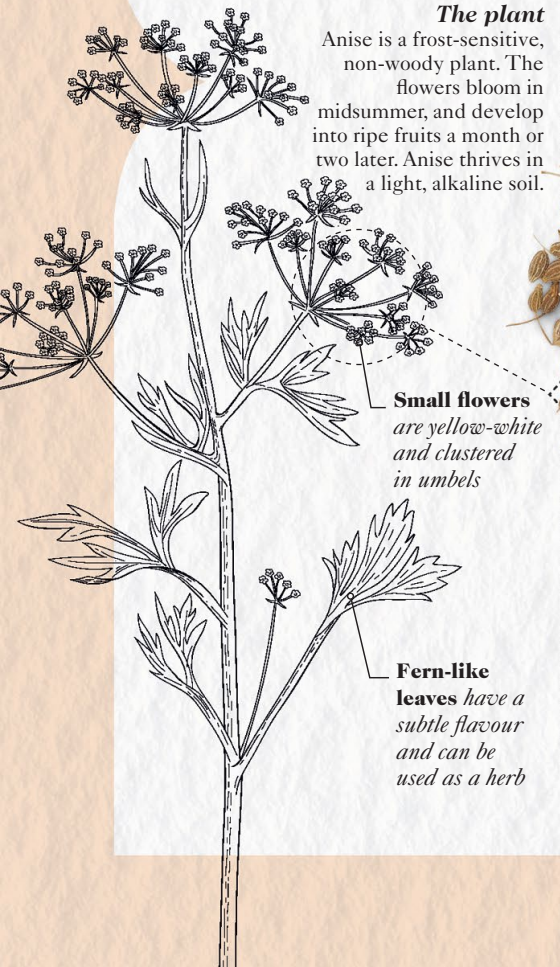
MAJOR FLAVOR COMPOUNDS
Anethole, anisyl alcohol

PARTS USED
Fleshless fruits housing small seeds

METHOD OF CULTIVATION
Grown as an annual crop, plants are pulled up or mown when the fruits ripen.

COMMERCIAL PREPARATION
Fruits are left to dry for a week, then threshed to separate the flower heads.

NON-CULINARY USES
The essential oil is used in cough medicine, perfumes, and soaps. Also known as a traditional remedy for gas and headaches.



The plant
Anise is a frost-sensitive, non-woody plant. The flowers bloom in midsummer, and develop into ripe fruits a month or two later. Anise thrives in a light, alkaline soil.

Small flowers *are yellow-white and clustered in umbels*

Fern-like leaves *have a subtle flavour and can be used as a herb*

Seeds *often retain bits of stalk, but excessive stalk indicates sub-standard quality*

Cheek *that seeds are free of dust*

Whole
The brown-green oval seeds are best bought whole and ground as required. Seeds will keep for up to two years in a sealed container. Wild black anise from Calabria in Italy is sweeter and less bitter than standard anise, but much harder to source.

Spice story

Records show ancient Egyptians using anise as a cure for snake bites, but it was the Romans who really developed a fondness for its intensely sweet, licorice-like taste, drawing on anise to flavor everything from the provisions of a lowly centurion to the spiced wine, *conditum*, and rich cake, *mustaceoe*, served at special banquets. Anise endured as a popular kitchen garden plant into the Middle Ages, especially in the Pyrenees, where monks produced an anise-flavored liqueur that the French drank as an aperitif and also added to stews and stocks. Today, several liqueurs are still flavored with anise's essential oil, including French *pastis*, Greek *ouzo*, Turkish *raki*, and Arab *arrak*. Anise has also long been regarded as an effective aid to digestion; in India today the fruits are commonly chewed whole after meals.

Region of cultivation
Anise is cultivated widely in its native region of the eastern Mediterranean, Egypt, and the Middle East, and commercial crops are now grown as far afield as the Baltic countries and Latin America. Cultivation has also spread east to India, China, and Japan.

Kitchen creativity

Anise is most frequently used to flavor sweet baked goods, but has many savory uses as well. Anise and fennel seeds are largely interchangeable in Asian cooking. If using an anise-based liqueur, add the lightest drizzle to avoid overwhelming a dish.

BLENDING SCIENCE

The unmistakable herby licorice flavor of anise derives from the powerful anethole compound. Spice pairings can be made through the other, more subtle compounds—anisyl alcohol for its hints of cherry, vanilla, and chocolate, as well as estragole and traces of pinene and limonene.

ANISYL ALCOHOL
sweet cherry / vanilla / floral

ESTRAGOLE
licorice / harsh / herbal

PINENE
woody / spicy / camphorous

ANETHOLE
sweet / medicinal / fennel-like

pair with spices that have similar tastes:

⊕ **vanilla** adds creaminess as well as sweetness

⊕ **cocoa** flavor contributes earthy bittersweet notes

mix with licorice-tasting spices or other penetrating flavours:

⊕ **licorice** has similar flavour,adding eucalyptus cineole and sweetness

bay contributes a fresh, penetrating herbiness

enhance woody notes with another pinene:

⊕ **black pepper** also brings a gentle pungency

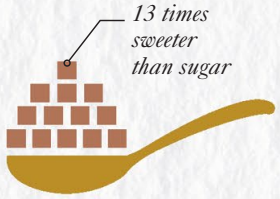
combine with other sweet or licorice flavors:

⊕ **nutmeg** contains dipentene, and is sweetly warming

⊕ **fennel** enhances the licorice character thanks to its estragole and anethole

The sweetness compound

Anethole comprises up to 90 percent of the flavor oils in anise and conveys the spice's licorice flavor. The compound also excites the sweetness receptors on human taste buds, making it sweeter than sugar—but without the calories. It is no surprise, then, that anise has long been the spice of choice for flavoring sweet candies and liqueurs, especially before the ready availability of sugar.



FOOD PARTNERS

⊕ **Celeriac** Add ground anise to a rich dressing for celeriac remoulade.

⊕ **Potatoes** Fry chopped onions with whole anise, curry leaves, and mustard seeds to flavor a potato and pea curry.

⊕ **Fish** Stir a teaspoonful into a South Indian–style coconut fish soup or tomato-based Mediterranean fish stew.

⊕ **Pork** Add the toasted seeds to sausage meat used for meatballs or stuffing.

⊕ **Fruit** Incorporate the seeds into a sweet pastry dough for a lemon, quince, or apple tart, or fry them in a batter for apple or banana fritters.

RELEASE THE FLAVOR

Anethole dissolves in alcohol and oil but not in water. Fry gently in oil or other fats before mixing into the rest of the dish, or use alcohol (e.g. from rice wine or fermented soy sauce) in a liquid-based dish to disperse.

Alcohol *Oil*

BLENDS TO TRY

Try these recipes for classic blends featuring anise, or why not adapt them with some blending science?

Burmese garam masala p.48
Shandong spice bag p.58
Nanjing spice bag p.59

STAR ANISE

Licorice | Sweet | Warm

BOTANICAL NAME
Illicium verum

ALSO KNOWN AS
Chinese anise, badian anise, Siberian anise

MAIN FLAVOR COMPOUND
Anethole

PARTS USED
Seed pods, seeds

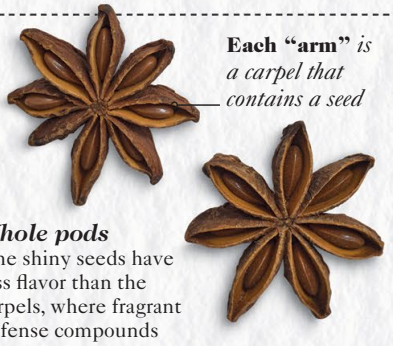
METHOD OF CULTIVATION
The fruits are harvested before they ripen, from late summer through early winter.

COMMERCIAL PREPARATION
The fruits are dried, typically in the sun, until hard and woody and the pods' points have split to expose the seeds.

NON-CULINARY USES
In soaps, perfumery, and cough mixtures; in Chinese medicine for stomach pain, headaches, and rheumatism.

The plant
Star anise is the fruit of a small Chinese evergreen tree, closely related to magnolia. Trees can bear fruit for 100 years or more.

Ground
The seeds and woody carpels are used to make the ground spice. The flavor compounds evaporate fast, so it does not stay fresh for long.



Whole pods
The shiny seeds have less flavor than the carpels, where fragrant defense compounds are concentrated.

Spice story

Star anise's Latin name *Illicium* means "allurement," referring to its sweet smell and pretty shape. It has been cultivated for more than 3,000 years for culinary and medicinal use in its native China and Vietnam. It symbolizes good fortune in Chinese culture, where finding a star with more than the normal eight arms is considered very good luck. From the late Middle Ages it was traded along the tea route from China via Russia, and for much of this time it was known as Siberian cardamom. Due to the relatively high price of anise, and the increasing popularity of Asian cooking, star anise has never been more widely used than it is today. Indeed, shortages have occurred during international flu outbreaks because star anise contains shikimic acid, a chemical used to make the antiviral drug Tamiflu.

Region of cultivation
Native to southwest China and northeast Vietnam, star anise is cultivated in China, India, Laos, Vietnam, the Philippines, Japan, and Taiwan.

Kitchen creativity

Star anise is essential to Chinese cuisine and indispensable to five-spice powder. In South India, it may be added to a biryani and used in versions of garam masala. Vietnamese *pho* would be incomplete without its distinctive flavor.

BLENDING SCIENCE

Star anise shares the anethole flavor compound with anise, fennel, and licorice, even though they are from unrelated plants. Anethole is 13 times sweeter than table sugar, and gives the spice its sweetness. The overall flavor profile is more complex than that of other anethole spices, and features linalool's alluring floral flavor.

CINEOLE
eucalyptus / mildly medicinal / penetrating

draw out the underlying eucalyptus notes with more cineole spices:

- ⊕ **cardamom** also brings floral notes through shared linalool
- ⊕ **bay** adds pinelike notes, and shares linalool for fresh, floral aromas and slight bitterness
- ⊕ **black cardamom** and **grains of Selim** lend an appetizing wood smoke aroma to the blend
- ⊕ **galangal** and **ginger** also make excellent, fresh and zesty pairings

ANETHOLE
sweet / licorice / warming

pair with similarly sweet and/or warming spices:

- ⊕ **nutmeg, mace** and **allspice** possess eugenol that synergizes with anethole; nutmeg and mace also share terpineol for fresh, woody notes
- ⊕ **cinnamon** has a sweet, warming spiciness that complements anethole

PHELLANDRENE
green / peppery / citrus

add heft to traces of fresh, herbal tanginess by combining with more phellandrene spices:

- ⊕ **peppercorn** brings a lingering spicy heat
- ⊕ **dill** also features limonene for a stronger citrus edge

FOOD PARTNERS

⊕ **Vegetables** Add a pod to braised leeks, cabbage, or fennel; sprinkle the ground spice over pumpkin, root vegetables, and swede before roasting; or add a pinch to sweet vegetable purées.

⊕ **Rice** Put a whole pod in the pan when cooking basmati or sticky Thai rice—its delicate, sweet flavor complements biryanis and pilaus.

⊕ **Beef, pork** Use the whole spice to add freshness to an oxtail stew, or add to Chinese slow-braised pork.

⊕ **Seafood** Mix star anise, ginger, and peppercorns in the saucepan before adding clams or mussels and wine or a splash of sherry or Pernod for a Vietnamese-style dish.

⊕ **Fruit preserves** Combine with quince, figs, apples, apricots, and tropical fruits such as pineapple and mango to add a fresh licorice taste.

BLENDS TO TRY

Try these recipes for classic blends featuring star anise, or why not adapt them with some blending science?

Vindaloo paste p.44
Burmese garam masala p.48
Shandong spice bag p.58
Nanjing spice bag p.59
Five-spice powder p.60

RELEASE THE FLAVOR

Much of the flavor is locked up in the hard carpels of the pods, which protect the seeds and contain concentrated flavor compounds that evolved to repel pests. There are various ways to release and enhance that distinctive flavor.

Toast at 266–356°F (130–180°C) to create nutty pyrazine compounds.

Use oil and alcohol (e.g. rice wine, fermented soy sauce) to disperse the anethole.

Cooking with alliums creates meaty flavors when sulfur reacts with the anethole.

Slow cook with whole pods to allow time for the flavors to escape the woody husk.

CHINESE STEAMED SALMON WITH CHILI AND STAR ANISE

Simple and easy to prepare, this delicately spiced Chinese supper is given a piquant twist with star anise and Scotch bonnet chili, adding depth to the dish without overpowering the mild flavor of the fish. It works especially well with lightly smoked salmon, but if you prefer you can use unsmoked fillets.

SPICE IDEAS

Swap in **different colored peppers**: black pepper for a more aromatic, complex heat; green pepper for dominant herbaceous notes.

Be inspired by the fresh spices to **try alternatives to star anise**: allspice will pick out fruity esters in chili; citrus-floral coriander will enhance the citral in ginger.

Replace **fresh chilis with dried**—rehydrated and sliced—for smoky, toasted flavors.

Serves 4

Prep time 30 mins

Cooking time 10 mins

4 lightly smoked salmon fillets, skinned
½ tsp ground white pepper
handful of star anise, broken up
1 tbsp Shaoxing wine or dry sherry
1 tbsp finely chopped fresh root ginger
1 Scotch bonnet chili, seeded and cut into around 12 strips
2 tsp light soy sauce
2 tsp dark soy sauce
3 spring onions, finely chopped
1 tbsp vegetable oil
2 tsp sesame oil
1 tsp chili oil

1 Rub the salmon fillets with the white pepper. Arrange them in a single layer in a heatproof dish, placing one piece of star anise underneath and one piece on top of each fillet of fish.

2 Pour in the wine or sherry, sprinkle the ginger over the fish, and place a few strips of chili on top of each salmon fillet.

3 Pour water to a depth of ¾in (2cm) into a steamer or deep pan with a trivet in the bottom, and bring to a simmer. Place the fish dish in the pan, cover the pan tightly with foil, and steam over low–medium heat for 8–10 minutes, depending on the thickness of the fish. Add more hot water to the pan if necessary.

4 When the fish is cooked, take the dish from the pan and remove the star anise pieces. Pour the soy sauces over the fish and sprinkle with the spring onions.

5 Heat a wok or heavy pan over high heat. Add the three oils and swirl them around the pan. When the oil is very hot and slightly smoking, remove from the heat and pour over the fish. Serve with steamed rice and stir-fried greens, such as bok choy.

FENNEL

Aniseedy | Warming | Bittersweet

BOTANICAL NAME
Foeniculum vulgare (bitter fennel), *F. v.* var. *dulce* (sweet fennel)

ALSO KNOWN AS
Sweet cumin

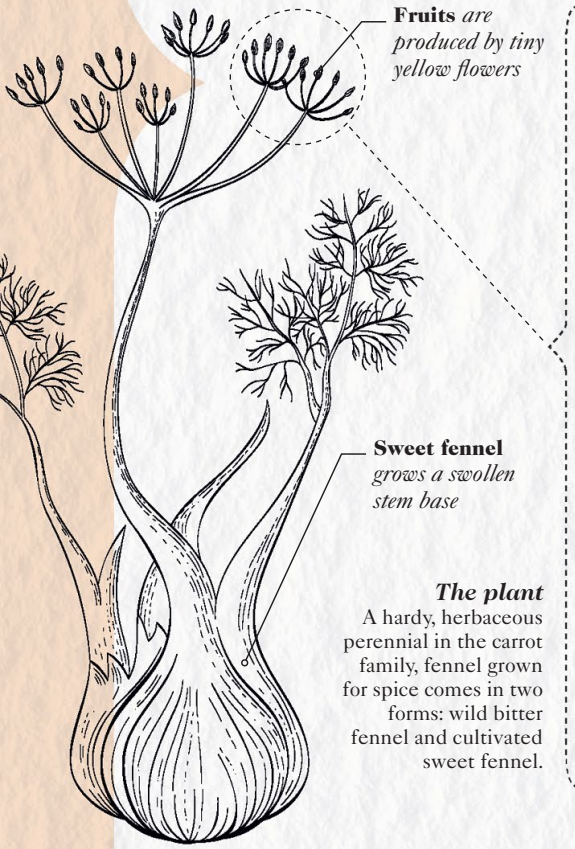
MAJOR FLAVOUR COMPOUND
Anethole

PARTS USED
Fruits (misnamed seeds), pollen

METHOD OF CULTIVATION
Plants are cut when the seeds have matured on the flowering umbels and taken on a sage green color.

COMMERCIAL PREPARATION
Umbels bearing the fruits are dried, then threshed, cleaned, and graded.

NON-CULINARY USES
Essential oil in cough medicines, soaps, and perfumes. In herbal medicine to improve vision and aid digestion.



The plant
A hardy, herbaceous perennial in the carrot family, fennel grown for spice comes in two forms: wild bitter fennel and cultivated sweet fennel.

Whole
Bitter fennel has a mildy bitter taste a little like celery seed. Aniselike sweet fennel is more widely available.

Spice story

Herbalists throughout the ages, from the Vedic tradition of India to the authors of Ancient Greek medical texts, have endorsed fennel for its sight-restoring powers and as an antidote to snake bites. The Greek for fennel is *maratho*, and the plains of Marathon, where the Greeks won a decisive battle against the Persians in 490 BCE, were named for their "fennel fields." The Romans introduced the spice to all the lands they conquered, and by the early medieval period its popularity was widespread across Europe, thanks in part to the King of the Franks, Emperor Charlemagne (742–814 CE), who demanded that it be cultivated on his Imperial farms. European colonists used fennel as a preservative and to disguise the flavor of meat past its best. They spread the plant to the Americas and Australia, where wild escapees are now considered noxious weeds.

Region of cultivation
Fennel is native to the Mediterranean and cultivated throughout Europe, but India is in fact the main producer. Other notable growers include Turkey, Japan, Argentina, North Africa, and the US (mostly California).

Kitchen creativity

Fennel enhances both sweet and savory foods with its mild aniseed character. The spice is most notable as a flavoring for Italian salami, and for its use in masala blends throughout South Asia, from Kashmir to Sri Lanka.

BLENDING SCIENCE

The main sweet aniseed flavor of fennel comes from powerful anethole, while penetrating fenchone contributes bitter pungency, and small amounts of citrusy limonene and pine-scented pinene are also present.

FENNEL
Fe

ANETHOLE
sweet / herby / aniseed

LIMONENE
citrus / herby / turpentine

PINENE
woody / spicy / pinelike

FENCHONE
camphorous / bitter / pungent

pair with other sweet spices containing licorice-like compounds:

⊕ **anise** and **star anise** are dominated by anethole and add herby, floral aromas

⊕ **dill seed** brings minty, licorice-like carvone and citrus notes of limonene

⊕ **nutmeg** is similarly sweetening; eugenol is a match for anethole

enhance the fresh, fruity side with another limonene:

⊕ **cardamom**'s penetrating eucalyptus-like cineole also helps to counterbalance anethole

combine with other pinenes to complement the woody spice notes:

⊕ **black pepper** adds a pungent warmth

⊕ **cumin** contributes an earthy, slightly bitter flavor

draw out fennel's penetrating, camphorous side:

⊕ **cassia**'s camphor will highlight the fenchone, but its sweetness will balance bitter notes

FOOD PARTNERS

⊕ **Plums and figs** Add toasted seeds when poaching or making jams and chutneys.

⊕ **Fruiting vegetables** Stir ground fennel into an eggplant, zucchini, and tomato *caponata* stew.

⊕ **Pork and beef** Mix into meatballs or lightly crush with salt as a rub for roasting pork belly skin.

⊕ **Oily fish** Crush with a little pepper and salt and then sprinkle on top of fish fillets before frying.

⊕ **Almonds** Sprinkle sugar mixed with crushed fennel over warm almond cookies.

RELEASE THE FLAVOR

Fennel's flavor-containing oils are housed within hollow tubes (canals) just beneath the outer ridges of the fruits.

Grinding the seeds will break the canals and help the oils to escape.

Toasting beforehand will create new roasted, nutty pyrazine flavors, which quickly combine with existing flavor compounds.

BLENDS TO TRY

Try these recipes for classic blends featuring fennel, or why not adapt them with some blending science?

Panch phoran p.43

Five-spice powder p.60

LICORICE

Sweet | Aniseedy | Warm

BOTANICAL NAME
Glycyrrhiza glabra

ALSO KNOWN AS
Sweetwood, Spanish juice plant, *jethimadh*

MAJOR FLAVOR COMPOUND
Glycyrrhizin

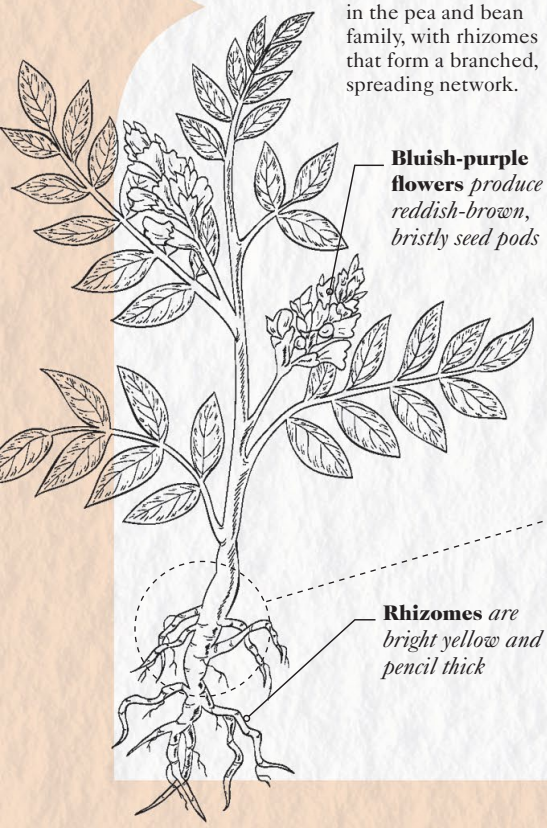
PARTS USED
Roots and rhizomes (underground stems)

METHOD OF CULTIVATION
Roots and rhizomes are harvested by digging up the whole plant when it is 3–5 years old.

COMMERCIAL PREPARATION
Roots and rhizomes are cut off, cleaned and trimmed, and then dried for several months.

NON-CULINARY USES
Tobacco flavoring; ingredient in cough medicines and lozenges; in traditional medicine to treat inflammation, peptic ulcers, and chest complaints.

The plant
Licorice is a herbaceous perennial in the pea and bean family, with rhizomes that form a branched, spreading network.



Powder
The ground dried root is available in various shades and in "fine" or "raw" varieties, depending on the plant variety and how it was processed.

Whole
Dried licorice root can be bought in slices or in pieces of up to 8in (20cm) long, and will store almost indefinitely in a sealed container in a cool, dry place.

Spice story

Ancient Assyrians, Babylonians, Egyptians, Greeks, and Romans all chewed licorice to allay thirst, freshen breath, and increase stamina. The spice reached China, where it was used as a stimulant and antidote to poison, via the Silk Road over 2,000 years ago. By the 12th century, licorice extract was being widely used in northern Europe, often cultivated by monks and prescribed for coughs, gastric ulcers, and chest complaints. The first licorice candy was made in 1760, and by the late 19th century candies and liqueurs were being manufactured across Europe, particularly in Nordic countries. The spice was also being used to flavor tobacco, and today the majority of the world's crop is grown for this purpose. Its use as a spice remains localized to China, India, and Scandinavia.

Region of cultivation
Licorice is native to the Mediterranean region and West Asia. It is cultivated mainly in Russia, Spain, and the Middle East, but also in North Africa, France, Italy, Turkey, North America, India, and China.

Kitchen creativity

The dried root or rhizome has an intense aniseed flavor and warm, lingering sweetness. It can be used to infuse sweet dishes, stocks, sauces, and stews, and it is added to spice blends such as Chinese five-spice. Use sparingly to avoid overwhelming the dish.

BLENDING SCIENCE

The powerful sweetening effect of licorice root is produced by glycyrrhizin, a compound that is around 50 times sweeter than sugar. The warming, medicinal flavors of this spice are produced by three compounds— aniseed-like estragole, eucalyptus-like cineole, and clovelike eugenol. Small amounts of floral linalool, cucumber-like aldehydes, and oregano-tasting phenols give licorice its rounded, complex taste.

ESTRAGOLE
aniseedy / warming / woody

CINEOLE
penetrating / eucalyptus / herbal

EUGENOL
medicinal / woody / warming

MINOR COMPOUNDS
floral / cucumber / oregano

combine with other warming spices to reinforce the aniseed notes:

- ⊕ **anise** adds an herby flavor with hints of cherry, creamy vanilla, and cacao alongside aniseed
- ⊕ **fennel** enhances the sweet flavor and adds complexity to the aniseed character
- ⊕ **star anise** has penetrating eucalyptus and peppery mint notes, alongside sweet anethole

add more cineole to complement the slightly herbal notes:

- ⊕ **bay** contributes a fresh, penetrating, herbal-floral flavor
- ⊕ **cardamom** intensifies eucalyptus flavors, adding some mint and lemon notes

pair with other eugenol-rich spices:

- ⊕ **clove** contributes sweet, astringent, camphorous notes
- ⊕ **cinnamon** and **cassia** are similarly sweet, and add woody and citrus notes

make unusual pairings through the minor compounds:

- ⊕ **coriander** enhances the floral notes of licorice
- ⊕ **vanilla** has floral, leafy notes, alongside aniselike anisaldehyde and creamy flavours
- ⊕ **nigella** and **ajwain** will partner with trace oregano-like compounds

BLENDS TO TRY

Use and adapt these classic blends featuring licorice:

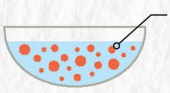
Nanjing spice bag p.59
Five-spice powder p.60

FOOD PARTNERS

- ⊕ **Citrus** Sprinkle a little ground licorice over a grapefruit and orange salad.
- ⊕ **Asparagus, fennel** Add to a butter dressing for grilled asparagus, or sprinkle over roasted fennel with lemon.
- ⊕ **Oily fish** Add ground licorice to a cure for salmon or trout.
- ⊕ **Ham, beef** Infuse a braising liquid for a ham or beef brisket with licorice root.
- ⊕ **Baking** Use ground in gingerbread dough, or steep licorice root in the syrup for a steamed sponge pudding.
- ⊕ **Preserves** Use to flavor apple jelly and cherry jam, or with cardamom and coriander in a Scandinavian plum chutney.

RELEASE THE FLAVOR

The glycyrrhizin in licorice helps to disperse the flavors of both licorice and any other spices in a dish by enabling oil and water to mix.



Added to water, glycyrrhizin can thicken to form a gel that allows oil and water to form a smooth mixture.

Add licorice near the start of cooking to maximize the taste.

Steep the root in hot water first for dishes with a short cooking time or little liquid.

MAHLEB

Bittersweet | Fruity | Woody

BOTANICAL NAME
Prunus mahaleb

ALSO KNOWN AS
Mahlab, *mehlepi*, rock cherry, St. Lucie cherry

MAJOR FLAVOR COMPOUND
Coumarin

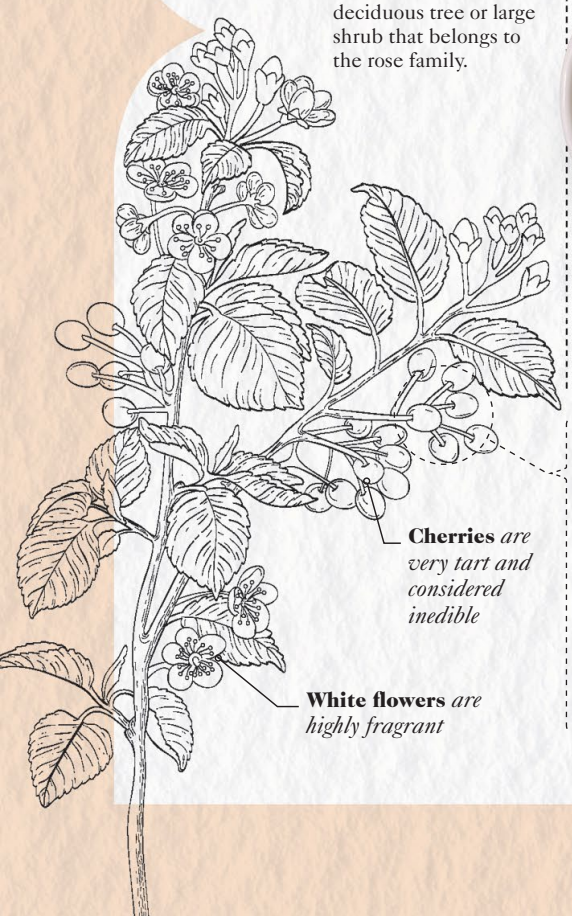
PARTS USED
The kernel (seed) within the stone of the fruit

METHOD OF CULTIVATION
The ripe cherries are harvested in the autumn, when they have turned dark purplish-black.

COMMERCIAL PREPARATION
The small, soft kernel is extracted by cracking open the stone inside the thin-fleshed cherry fruit. The seed is then blanched, dried, and ground or sold whole.

NON-CULINARY USES
Essential oil is used in perfumery.

The plant
Mahleb cherry is a deciduous tree or large shrub that belongs to the rose family.



Cherries *are very tart and considered inedible*

White flowers *are highly fragrant*

Ground mahleb *should be pale cream in color*

Powder
Less bitter and flavorful than whole kernels, the powder turns rancid fairly quickly due to its high oil content.

Oval kernels *are soft and about the size of peppercorns*

Whole
Whole kernels retain their flavorful oils better than ground spice, but should be frozen for prolonged storage.

Spice story

Mahleb cherry stones have been found at Mediterranean and Middle Eastern prehistoric sites, but written evidence of their use in ancient times is scarce. The earliest perfume recipes listing kernels for their aromatic qualities date back only to the 12th century CE. There is some evidence, though, that mahleb may have been cultivated as early as the Sumerian era (4500–1900 BCE) in ancient Mesopotamia, around modern-day Iraq and Syria. In the native regions of the mahleb cherry tree, use of the dried, ground kernels as a culinary spice dates back centuries, popular in rich breads and cakes enjoyed at religious holidays. Mahleb is not commonly used outside Greece, Turkey, North Africa, and the Middle East, although Greek Americans often add it to their European-style yeast cakes and pastries.

Region of cultivation
Mahleb is native to the Mediterranean region, parts of Central Asia, and Iran. It is mainly cultivated in the Anatolia region of Turkey, and in Syria and Iran.

Kitchen creativity

Mahleb is luxuriously sweet and fruity, with an almond aroma and a woody cherry taste; whole kernels also release a bitterness when chewed. Mainly known as a baking spice, it can add fruit-and-nut notes to savory dishes.

BLENDING SCIENCE

A lactone called coumarin produces mahleb's creamy taste, like sweet clover and apricot. Almond notes come from methoxyethyl cinnamate, and the spice also contains woody, peppery azulene and balsamic, fruity pentanol, as well as green apple–like dioxolane. Bitterness in the fresh spice comes from phenols.

MAHLEB
Mb

COUMARIN
sweet / floral / grassy

METHOXYETHYL CINNAMATE
warming / balsamic / fruity

AZULENE
woody / peppery / herbal

PENTANOL
balsamic / fruity / floral

pair with sweet spices or those with creamy nuances:

- ⊕ **clove** contributes sweet, astringent, camphorous notes
- ⊕ **nutmeg** adds warm spiciness
- ⊕ **licorice** brings sweetness and eucalyptus-like notes, and sometimes contains coumarin-like substances
- ⊕ **vanilla** lends rich, mellow creaminess

combine with other warming spices:

- ⊕ **cinnamon** and **cassia** contribute sweet, spicy, woody qualities
- ⊕ **galangal** contains a similar cinnamate compound and hints of cherry, adding a penetrating pungency
- ⊕ **ginger** adds hotness and sweet, citrusy notes

complement the sweet woodiness of mahleb:

- ⊕ **sesame** brings harmonizing nutty and bready flavors; pale, unroasted seeds also have a creamy taste
- ⊕ **cacao** adds bitter chocolate notes, pairing well with the sweet coumarin

pair with spices that either contain pentanol or enhance its flavor:

- ⊕ **poppy** seeds contain pentanol and add earthiness
- ⊕ **lemon myrtle** has distinctive green odors from the fruity tasting heptanone, and adds a powerful lemon-lime flavor

FOOD PARTNERS

- ⊕ **Stone fruit** Use ground mahleb to thicken a sweet cherry sauce, add it to a plum crumble topping, or sprinkle it over roasted apricots or peaches.
- ⊕ **Meat** Add to a Turkish dry spice rub for roast duck legs, pork, or lamb.
- ⊕ **Baking** Include mahleb with other warm spices in festive pastries, or add it to the sweet dough for an apricot tart.
- ⊕ **Ice cream** Sprinkle into cherry ice cream and top with candied pistachios.
- ⊕ **Tonka beans** Partner with vanilla-like tonka beans, which are similarly high in coumarin, in sweet recipes.

RELEASE THE FLAVOR

Of mahleb's flavor compounds, only dioxolane and some bitter phenols are soluble in water to any great extent. Cooking in a water-based liquid will therefore result in a "green" and bitter taste and should be avoided.

Grind kernels to release short-lived oils. Leave for a few minutes before use to let bitter phenols evaporate.

Add to fats before mixing into a recipe to allow sweet and woody flavors to come to the fore.

Application of heat will decrease the bitter flavors and allow hints of cherry fruitiness to emerge.

VANILLA

Sweet | Musky | Woody

BOTANICAL NAME
Vanilla planifolia

MAJOR FLAVOR COMPOUND
Vanillin

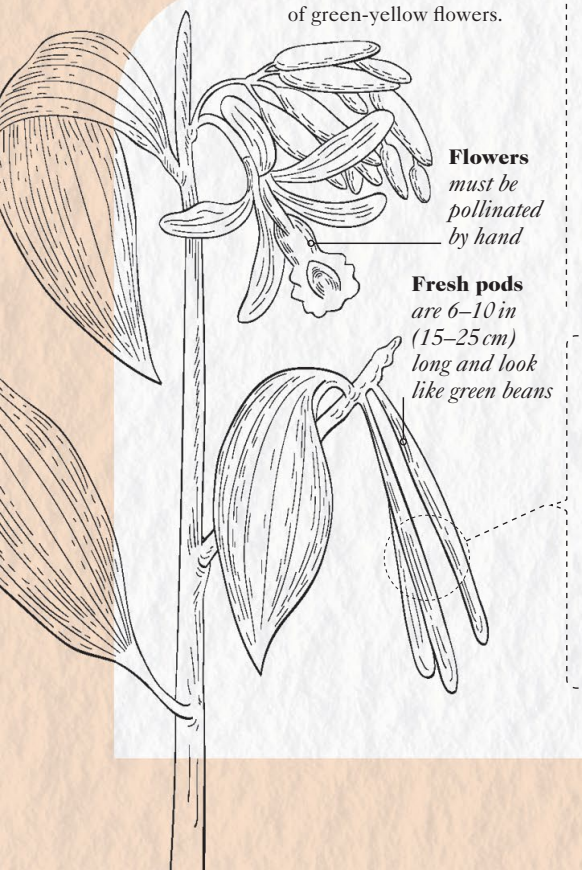
PARTS USED
"Pods" (which are really fruits)

METHOD OF CULTIVATION
Plants are trained up posts or trees and the flowers pollinated by hand. Pods are picked before fully ripe.

COMMERCIAL PREPARATION
Pods are scalded or steamed, then sweated in sealed containers to make them release defensive phenol molecules. These react with the air and destructive plant enzymes to disintegrate into dark, flavorful compounds. Pods are then dried until black and shriveled to one-fifth their original weight.

NON-CULINARY USES
In perfumes and cosmetics.

The plant
Vanilla is the fruit of a perennial, vinelike tropical orchid that bears bunches of green-yellow flowers.



Flowers *must be pollinated by hand*

Fresh pods *are 6–10 in (15–25 cm) long and look like green beans*

Extract
This is made by macerating pods in alcohol. Find labels saying "natural extract" and stating around 35 percent alcohol.

Dark, plump *appearance is a sign of good sweating and maturing*

Whole pods
Brittleness is a sign of age, but pods can keep their flavor for up to 4 years. Frosting is caused by exposure to air.

Spice story

Vanilla was first cultivated for its scent 1,000 years ago on the eastern coast of Mexico by the Totonac people. The first recorded use as a flavoring dates to the 15th century CE, when the Aztecs conquered the Totonacs, discovered the beanlike fruit, and used it to flavor cacao drinks. The Spanish conquistador Cortés was served just such a drink by the Aztec king in 1519 and took vanilla pods and cacao beans back to Spain. But Mexico retained a monopoly because the pods would only form when pollinated by native orchid bees. That is, until the 1830s, when a Belgian botanist unraveled the mystery and devised a technique of hand pollination. In 1874, German chemists created a synthetic alternative to the natural flavor, and now 97 percent of vanilla-flavored foods are made with synthetic vanillin.

Region of cultivation
Vanilla is native to Mexico and Central America, where it is still cultivated. It is also grown in Madagascar, Réunion, India, Sri Lanka, Indonesia, and Tahiti.

Kitchen creativity

Rich, mellow vanilla has historically been used in sweet cooking, but is an increasingly popular addition to savory dishes, particularly fish and seafood. Tread carefully, though, as it can easily overwhelm a dish.

BLENDING SCIENCE

Vanillin is a phenol that makes up 85 percent of vanilla's flavor and has a natural affinity with other sweetly fragrant spices. But more than 250 flavor compounds can be present, which encompass woody, spicy, floral, and fruity aromas. These lesser compounds distinguish vanilla pods from synthetic vanillin flavoring.

VANILLA
Va

VANILLIN
sweet / warming / creamy

connect with other naturally sweet and/or warming compounds:

- ⊕ **cinnamon, cassia** intensify sweetness and bring in spicy heat and floral notes
- ⊕ **ginger, galangal** convey both heat and sweetness, and cherry hints from galangal
- ⊕ **licorice** is an ideal partner due to intensely sweet glycyrrhizin and its aniseed flavor

GUAIACOL
smoky / woody / slightly medicinal

draw out notes of wood and smoke:

- ⊕ **cacao**'s blend of smoky, earthy flavors have close synergy
- ⊕ **allspice** has a warming woodiness
- ⊕ **black pepper**'s warm, woody, and citrusy aspects make it an unexpected partner

ANISALDEHYDE
sweet / woody / aniseedy

boost aniseed with spices that share a similar compound:

- ⊕ **clove, nutmeg** are sweet, woody, and somewhat penetrating, which harmonizes with the aniseed flavor
- ⊕ **anise** also has anisaldehyde as a minor compound

PIPERONAL
floral / subtle cherry

pick out an unusual cherry connection:

- ⊕ **mahleb** has a nutty sweetness and lingering cherry taste

FOOD PARTNERS

- ⊕ **Vegetables** Add seeds to carrots, cauliflower, root vegetables, or potatoes. Put a split pod in a tomato chutney.
- ⊕ **Strawberries** Combine vanilla and black pepper in a caramelized sugar syrup for macerating strawberries.
- ⊕ **Fish, seafood** Stir into melted butter and brush over grilled lobster, scallops, or fish; put a sliver of pod in a pan of mussels before steaming.
- ⊕ **Desserts** Add to chocolate and cream desserts. Use vanilla-flavored sugar in cake and pancake batters.

RELEASE THE FLAVOR

Many trace compounds in vanilla are quick to evaporate: use seeds immediately and cook on low heat to avoid losing subtle nuances.

Lightly pound pods to release flavor from the inner fibers.

Add whole pods early in cooking to allow flavors to diffuse out of the tough tissue.

Vanilla chooser

Depending on where they were grown and how they were dried and cured, vanilla pods will derive from one of three orchid species and have varying levels of vanillin and different flavor profiles.

Country	Plant	Flavor content	Description
Madagascar, Réunion	*Vanilla planifolia*	2% vanillin	Bourbon vanilla is esteemed as rich and balanced.
Mexico	*Vanilla pompona*	1.75% vanillin	Mexican vanilla carries winelike and fruity flavor compounds.
Tahiti	*Vanilla tahitensis*	1.70% vanillin	The most expensive vanilla, with a deep flavor that includes cherry-chocolate, licorice, and caramel.
India, Sri Lanka	*Vanilla planifolia*	1.50% vanillin	Vanilla grown in South Asia has lower levels of vanillin, resulting in a gentler flavor and a smokiness.

NUTMEG

Bittersweet | Woody | Warm

BOTANICAL NAME
Myristica fragrans

ALSO KNOWN AS
True nutmeg, fragrant nutmeg

MAJOR FLAVOR COMPOUND
Myristicin

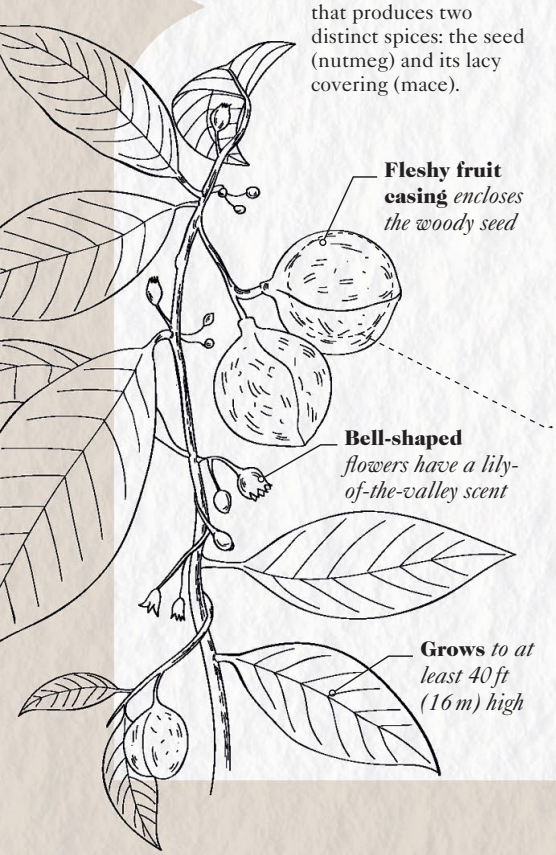
PARTS USED
Seed kernels

METHOD OF CULTIVATION
Fruit is harvested several times a year; one tree yields 10,000 or more nutmegs a year.

COMMERCIAL PREPARATION
Fruit is split open, dried, and the lacy aril removed to make mace. Seeds shells are cracked open to remove nutmegs.

NON-CULINARY USES
In pharmaceuticals, including toothpaste and cough syrups. Mild pain-killing power is used to treat toothache and joint pain.

The plant
Nutmeg comes from a tropical evergreen tree that produces two distinct spices: the seed (nutmeg) and its lacy covering (mace).



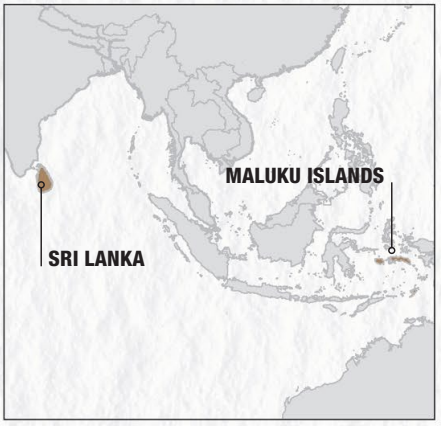
Powder
Nutmeg is available ground, but its flavor oils are among the quickest of all spices to evaporate: far preferable to buy whole and grate fresh.

Kernels *are revealed after cracking open the seed casing*

Whole
Kernels keep for at least a year in a sealed container in a cool, dark place. Discard if black spots develop.

Spice story

Native to the Banda Islands in the Moluccas (Maluku) archipelago of Indonesia, nutmeg has a complex, violent history. Its source was initially kept secret by traders who wanted to protect their valuable commodity, treasured for its rarity, flavor, and apparent aphrodisiac and healing properties. By the 16th century there was such huge demand for nutmeg in Europe that it was said to be more precious than gold, triggering a race to find and take control of its source. Portugal conquered the Moluccas in 1511, then the Dutch wrested control in 1599, and England seized two of the Banda Islands in 1603. The spice was so valued by the Dutch that they struck a deal with England to take back one of the islands in return for one of their settlements in the New World. The land they gave to England was known then as New Amsterdam—and today as New York City.



Region of cultivation
Nutmeg trees are grown throughout the Maluku (Moluccas) islands of Indonesia, and also in Sri Lanka, the Caribbean (notably Grenada), and South Africa.

Kitchen creativity

Nutmeg's deep, sweet, woody flavor works in both sweet and savory dishes. Somewhat penetrating and astringent with tannins, it can easily overpower a dish but blends happily with other strong spices.

BLENDING SCIENCE

Nutmeg's woody aroma comes from myristicin, which is integral to its flavor profile, though it makes up only a small proportion of the oil. Nutmeg also contains peppery, fruity sabinene, floral geraniol and safrole, clovelike eugenol, eucalyptus-scented cineole, and conifer-like pinene.

EUGENOL, CINEOLE
clovelike / eucalyptus / penetrating

bolster with other penetrating spices:

- ⊕ **cardamom** shares both compounds and brings floral sweetness and hints of camphor
- ⊕ **grains of Selim** shares cineole and also pinene, bringing a medicinal camphorous flavor like rosemary
- ⊕ **clove**'s flavor is owed to cineole and it brings added depth and sweetness
- ⊕ **cassia** has cineole and its cinnamaldehyde can resist nutmeg

GERANIOL, SAFROLE
rosy / sweet

add depth to the sweetness:

- ⊕ **allspice** contains similarly floral linalool and shares eugenol and cineole
- ⊕ **curry leaf** has many flavor profile overlaps with nutmeg, sharing both these compounds, as well as pinene and cineole

MYRISTICIN
woody / warm / balsamic

complement with warming spices:

- ⊕ **ginger**'s zingerone adds zesty heat, with citrus-sweet crossover
- ⊕ **black pepper** also has a shared floral and citrus background
- ⊕ **anise** has some myristicin and enhances nutmeg's sweet woodiness

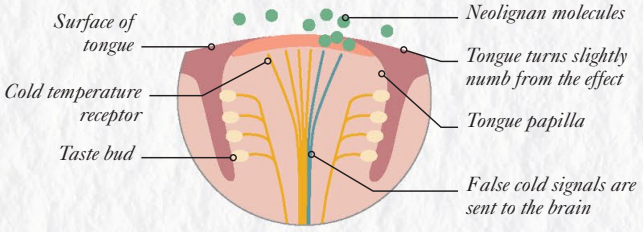
SABINENE
oranges / pepperiness / woody

bring out sabinene's fruity piquancy:

- ⊕ **garlic** shares sabinene, and its sulfurous pungency stands up well to powerful nutmeg
- ⊕ **juniper** shares nutmeg's pinene, and citrus notes from limonene work well with orangey sabinene

Neolignans' cooling effect

A group of chemicals called neolignans were recently discovered in nutmeg oil. These act on the temperature-sensing nerves on the tongue and in the mouth to give a numbing sense of lingering coolness.

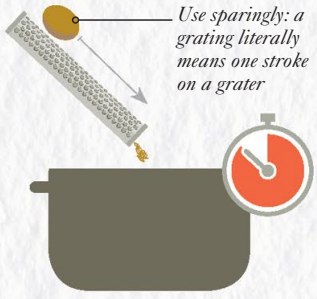


FOOD PARTNERS

- ⊕ **Spinach** Grate over buttered or creamed spinach or add to the filling for spinach and ricotta ravioli.
- ⊕ **Lamb** Add a generous grating to meatball mixture or use in moussaka.
- ⊕ **Sauces and drinks** Include nutmeg in béchamel, cheese fondue, soufflés, Indian golden latte (*haldi doodh*), eggnog, and Caribbean nutmeg ice cream.
- ⊕ **Sweet pastries** Use in a Sienese *panforte* or sprinkle over custard tarts.

RELEASE THE FLAVOR

Nutmeg's flavor oils are so powerful they can easily overpower a dish, yet they are also short-lived.



Add toward the end of the cooking time for a stronger, more complex flavor, because the oils are very quick to evaporate.

BLENDS TO TRY

Use and adapt these classic blends featuring nutmeg:

Turkish baharat p.23
Bumbu p.52
Jamaican jerk rub p.64
Mulling spice p.73
Quatre épices p.74

CHICKEN AND EGGPLANT BIRYANI WITH SEVEN-SPICE

The biryani is a true melting pot of a dish. Conceived in Persia, it was introduced to India by Arab merchants, and became popular in almost every region. Seven-spice, Lebanon's answer to garam masala, gives this version a rich, smoky, Middle Eastern flavor. For a milder chili kick, simply halve the amount of chili flakes.

SPICE IDEAS

Experiment with **your own seven-spice** mix: replace sweet spices with cumin and/or nigella for earthiness, or fenugreek for musty, bittersweet notes.

Highlight eucalyptus-like cineole found in several of the dry spices by **swapping fresh ginger** for cineole-rich galangal.

Preserve more of the pungent gingerols and zingiberene by **adding fresh ginger later**—at the same time as the peas—for a zestier hit of flavor.

Serves 4–6

Prep time 30 mins

Cooking time 1 hour 40–50 mins

For the seven-spice

1 tbsp black peppercorns
1 tbsp allspice berries
1 tsp cloves
1 tsp coriander seeds
1 tbsp ground cinnamon
1 tsp ground ginger
1 tsp grated nutmeg

For the biryani

5 tbsp (75 g) butter
4 skinless, boneless chicken thighs
4 cloves
1 star anise
8 black peppercorns
1 cup (250 g) basmati rice
4–5 tbsp vegetable oil
6–8 garlic cloves, thinly sliced
3 in (7 cm) piece fresh root ginger, finely grated
1 tsp chili flakes
1 tbsp seven-spice (see above)
2 eggplants, cut into ½ in (1 cm) cubes
sea salt flakes and freshly ground black pepper
1 cup (100 g) frozen peas

1 Make the seven-spice by grinding the whole spices and mixing with the remaining spices. Reserve 1 tablespoon and store the rest.

2 Preheat the oven to 325°F (160°C). In a large, ovenproof pan, melt about 2 tablespoons (25 g) of the butter and gently sauté the chicken thighs with the cloves, star anise, and peppercorns. When the chicken starts to turn opaque, cover with boiling water and bring to a simmer. Cook in the oven with the pan lid on for about an hour, until the meat is tender. Take out the chicken and set aside.

3 Remove the spices from the liquid, then add boiling water to fill the pan. Add the rice and a good pinch of salt. Boil for 7–8 minutes, until the rice starts to soften. While the rice is cooking, shred the chicken, then line a large, heavy-based saucepan with baking paper. Drain the rice and rinse under the cold tap.

4 Heat 2 tablespoons of the oil in a frying pan and fry the garlic for less than a minute over a medium heat. Then add the ginger, chili flakes, seven-spice, and a good pinch of sea salt. Add the chicken, followed by a little more oil and the diced eggplant. Stir fry for about 5 minutes, until the chicken and eggplant are coated in oil and spices. Season with salt and pepper.

5 Melt the remaining butter with a little oil, then pour into the paper-lined saucepan. Sprinkle with sea salt and add a thin layer of rice, then a layer of chicken and eggplant mix. Repeat, alternating the layers and finishing with rice. Poke a few holes in the mixture with a wooden-spoon handle, to allow steam to rise through the dish.

6 Wrap the pan lid in a tea towel and put it on the pan. Cook over the lowest heat possible for 35–45 minutes. With 15 minutes to go, add the peas to the pan. At the end of cooking, use a fork to check that the bottom layer of rice has formed a crust. If it has not, raise the heat and cook for up to 5 more minutes.

7 To serve, flip the biryani onto a dish, so that the golden, crispy rice base—known in Persian as the *tahdig*—is on top. For a crispier crust, omit the paper, but ensure that the rice does not burn while cooking.

MACE

Sweet | Warm | Aromatic

BOTANICAL NAME
Myristica fragrans

PARTS USED
Aril (seed covering) of the nutmeg seed

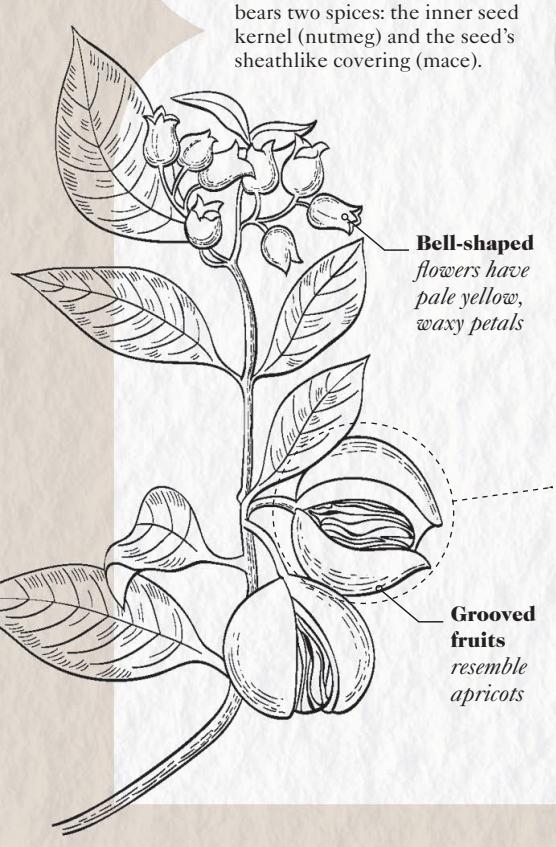
MAJOR FLAVOR COMPOUND
Sabinene

METHOD OF CULTIVATION
Ripe fruits are often harvested from trees using a long pole with a basket attached, called a *gai-gai*.

COMMERCIAL PREPARATION
The split fruit reveals a nutmeg seed with a plasticky, scarlet-red covering called an aril. The leathery aril is peeled off, pressed and dried. Grenadian mace is traditionally "cured" in the dark for several months. Mace is then either ground or sold whole as "blades" after drying

NON-CULINARY USES
In perfumes, soaps, and shampoos; in traditional medicine to relieve bronchial disorders and rheumatism, aid digestion, and improve circulation.

The plant
Mace is from a tropical tree that bears two spices: the inner seed kernel (nutmeg) and the seed's sheathlike covering (mace).



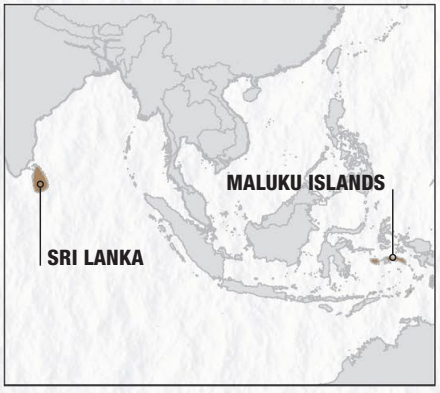
Powder
Ground mace keeps reasonably well, although subtler flavors are lacking.

Blades *exude oil when pressed with a fingernail*

Whole
Dried arils, or pieces thereof, are known as blades. Orange-red blades tend to be from Indonesia, while Grenadian blades are dried to a paler orange-yellow.

Spice story

Native only to the tiny Banda Islands in the Moluccas (Maluku) archipelago of Indonesia, mace was being traded with the Byzantine empire by the 6th century CE, where it was widely valued as a cure-all, food preservative, fumigant, and aphrodisiac. By the Middle Ages, mace had become one of the most sought-after and expensive spices of European cuisine. The appetite for these spices prompted a centuries-long, bloody power struggle between the Portuguese, Dutch, and English to gain control of the growing regions. Eventually, the English managed to establish their own supply by successfully transplanting nutmeg trees, along with their soil, to several of their colonies, including Grenada and Sri Lanka. With greater availability, nutmeg and mace overtook saffron and mustard as the spices of choice in Western cuisine, with mace more common (and cheaper) than nutmeg.



Region of cultivation
Mace is cultivated across the Maluku (Moluccas) archipelago of Indonesia, and also in Sri Lanka, South Africa, and the Caribbean—notably Grenada, which features an image of nutmeg and mace on its national flag.

Kitchen creativity

Mace will substitute for nutmeg in most sweet dishes, but it is mostly used to flavor savory sauces, meat, pickles, and chutneys. Use whole blades to infuse pale creams and clear broths where flecks of grated nutmeg are unwanted.

BLENDING SCIENCE

Peppery sabinene is less dominating in mace than in nutmeg and mace has more fragrant oils, with a wider diversity of perfumed compounds, including floral elemicin, which works in partnership with terpineol, and small amounts of eugenol and safrole. Mace lacks the mouth-puckering tannins of nutmeg, giving it a smoother mouthfeel.

SABINENE
woody / peppery / citrus / camphorous

pair with other sabinene spices:

⊕ **black pepper** is a great flavor match, sharing many of sabinene's qualities

⊕ **black cardamom** also brings smokiness, and limonene traces to enhance the citrus

⊕ **curry leaf** also has extra woody notes, pine flavors, and hints of mint

TERPINEOL
floral / citrus / pinewood

pair with another spice that is smooth with hyacinth-like aromas:

⊕ **coriander** is powerfully floral, with distinct pine and citrus compounds, making a highly effective match

SAFROLE
sweet / warming / aniselike

add safrole from elsewhere:

⊕ **star anise** carries this uncommon compound too and is strongly flavored with aniselike anethole; it also brings penetrating pepperiness

EUGENOL
eucalyptus / warming

draw out eucalyptus with eugenol from other spices:

⊕ **clove**'s sweet scent is from eugenol, which strengthens mace's eucalyptus, and also shares terpinenol

⊕ **allspice** also has strong eugenol, and adds deep, sweet pepperiness with a floral background

FOOD PARTNERS

⊕ **Vegetables** Sprinkle ground mace over a creamy potato bake, spinach or carrot soup, or try it in a vegetable pilau.

⊕ **Shellfish** Add a blade of mace to a shellfish broth, or sprinkle ground mace over potted shrimp or crab before stirring it through warm pasta or serving it on toasted rye bread.

⊕ **Pork, chicken** Sprinkle a little ground mace into the mixture for pork, ricotta, and lemon-zest meatballs. Add a blade to a béchamel sauce for a creamy chicken pie.

⊕ **Cheese sauce** Infuse milk with a blade of mace, then make into a cheese sauce for lasagne or macaroni and cheese.

⊕ **Desserts** Infuse into custard for a trifle or whisk into sweetened whipped cream to serve with fruit.

⊕ **Baking** Add ground mace to spiced cake batters, or sprinkle sparingly over pumpkin pie or milk puddings.

BLEND TO TRY

Use and adapt this spice blend recipe featuring mace:

Garam masala p.40

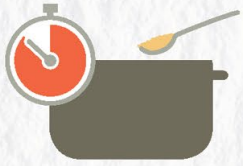
RELEASE THE FLAVOR

The oil-based compounds in mace dissolve poorly in water and its flavor can change with prolonged heating: some compounds evaporate and degrade while new terpenelike compounds are formed, producing tastes many people dislike.

Mace's more subtle terpene flavors can be lost through evaporation, so grind as needed and use immediately.

Include oil in the cooking liquid or gently fry, for example with an onion base, near the beginning of a dish.

Add whole mace early to give maximum time for oils to diffuse out of the blades, but be wary of lengthy cooking.



Add powder later as it diffuses and spreads more quickly, and this reduces evaporation of terpenes.

CARAWAY

Menthol | Warming | Earthy

BOTANICAL NAME
Carum carvi

ALSO KNOWN AS
Carvies, and (incorrectly) wild cumin, Persian cumin, meridian fennel.

MAJOR FLAVOR COMPOUND
S-carvone

PARTS USED
Seedlike fruits

METHOD OF CULTIVATION
Plants are grown for two years and harvested in the second summer, when the seedlike fruits darken.

COMMERCIAL PREPARATION
The cut flower heads are left for up to 10 days to dry and finish ripening, before being cleaned and threshed.

NON-CULINARY USES
The essential oil flavors commercial mouthwash and children's medicines; as a traditional remedy to aid digestion.

The plant
Caraway is a frost-hardy biennial in the carrot family. It thrives in rich clay soil and can grow up to 2 ft (60 cm) tall.

Fruits *develop from umbels of creamy white flowers*

Feathery leaves *are edible and taste quite similar to dill*

The "seeds" are actually a dry fruit

Whole
Store the brown, crescent-shaped "seeds" in a sealed container in a cool, dark place for up to six months. They benefit from gentle toasting.

Powder
Caraway can be bought in powder form, but the flavor quickly diminishes, and it is better to buy whole and grind as needed.

Spice story

Archaeologists have discovered caraway seeds in Stone Age refuse pits and 5,000-year-old dwellings in Switzerland, but the first written reference dates to around 1500 BCE, in an Egyptian herbal encyclopedia. The spice also held symbolic significance for the Egyptians, who placed the seeds in tombs to ward off evil spirits. The Romans knew it as *karo* or *careum*, and introduced the spice to northern Europe. By the Middle Ages, caraway had became a common ingredient in game and meat cookery and bean and cabbage dishes, as well as sweeter confections and as a flavoring for alcohol; *Kümmel*, the German for caraway, is also the name of a still-popular liqueur. Folklore abounds that placing caraway seeds in your lover's pocket will keep them faithful.

Region of cultivation
Caraway is native to central Europe and Asia, and its major producers are Finland, Poland, the Netherlands, Germany, Ukraine, Hungary, and Romania. Cultivation has also spread to North Africa, Egypt, and North America.

Kitchen inspiration

Caraway has a complex, warming taste, and its flavor can be found in many central European dishes. It is a key component of the Algerian and Tunisian blend *tabil*, and may be used in harissa, the chili-based paste from North Africa.

BLENDING SCIENCE

The most abundant flavor compound is the oil-loving terpene S-carvone, which, unlike most terpenes, confers a powerfully spicy flavor, with hints of menthol and rye, reminiscent of anise. The other major flavor compounds are citrusy limonene, with lesser amounts of woody sabinene.

S-CARVONE
spicy / menthol / licorice

LIMONENE
citrus / herby / turpentine

SABINENE
woody / orangey / spicy

bring depth to licorice/anise notes through related compounds:

⊕ **anise** and **star anise** are also licorice-like, due to medicinal anethole, and both bring woody warmth

⊕ **cinnamon** and **allspice** feature the very similar eugenol and will bring out the sweetness in caraway

pair with other limonenes to strengthen the zesty edge:

⊕ **cardamom** also brings sweetness and penetrating herbiness

⊕ **black pepper** adds gentle pungency and enhances the pepperiness

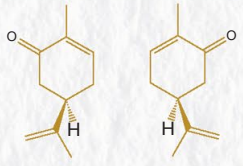
⊕ **ginger** has a complementary citrus background, and brings characteristic heat to a dish

enhance the sweet citrus notes with more sabinene:

⊕ **nutmeg** and **mace** are both partly dominated by sabinene and add a rich sweetness

Mirror-image compounds

S-carvone, the main flavor compound in caraway, has exactly the same molecular structure as D-carvone, the cooling, minty flavor compound found in spearmint. However, they are mirror images, which means these twin chemicals produce completely different aromas, and caraway's flavor is spearmint turned inside out!



D-carvone (spearmint) *S-carvone (caraway)*

FOOD PARTNERS

⊕ **Cabbage, beets** Add ground to buttered cabbage, and whole to beet slaw or soup.

⊕ **Red meats** Stir into sausage, beef, or lamb stews, or use to flavor dumplings and serve on the side.

⊕ **Duck, goose** Massage a mix of ground caraway, salt, and garlic over duck and goose before roasting.

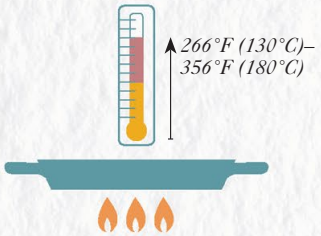
⊕ **Oily fish** Combine with pepper, fennel, and coriander in a cure.

⊕ **Swiss cheese** Drop a pinch of ground caraway into silky fondue.

⊕ **Cookies** Sprinkle the seeds over just-baked shortbread.

RELEASE THE FLAVOR

Cook with oil to allow flavor compounds to dissolve and add late in cooking if using ground caraway.



Toasting caraway increases the flavor intensity, but take care not to over-toast, which makes them bitter.

BLEND TO TRY

Try this recipe for a classic blend featuring caraway, and why not adapt it with some blending science?

Harissa p.33

DILL

Bitter | Citrus | Woody

BOTANICAL NAME
Anethum graveolens

ALSO KNOWN AS
False aniseed

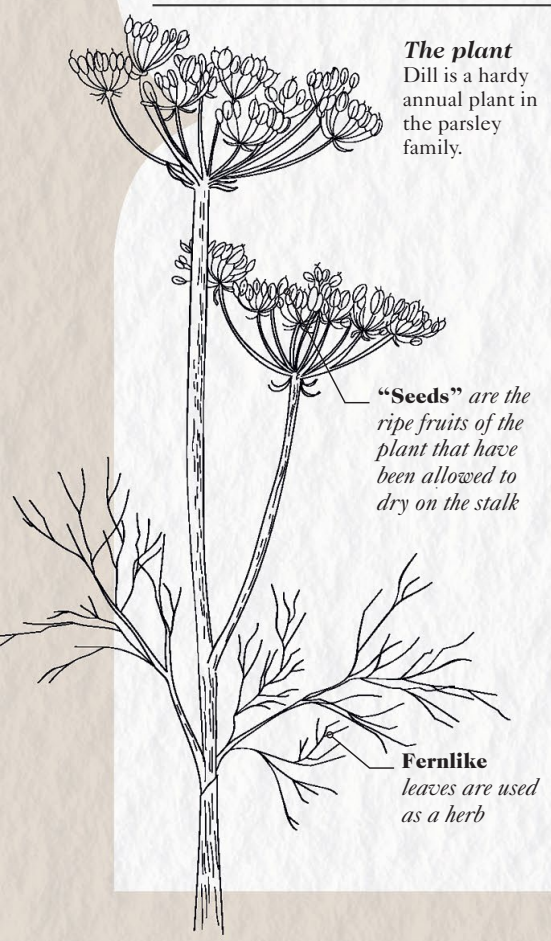
MAJOR FLAVOR COMPOUND
D-carvone

PARTS USED
"Seeds" (technically fruits)

METHOD OF CULTIVATION
Fruits are harvested after flowering. Seeds are left to ripen and dry on the stalk.

COMMERCIAL PREPARATION
Cut stalks are stacked and left for a week or so to dry. The fruits are then threshed from the flower heads by machine.

NON-CULINARY USES
In traditional medicine to treat stomach complaints—it's a common ingredient of gripe water—and as a gentle sedative.



The plant
Dill is a hardy annual plant in the parsley family.

"Seeds" *are the ripe fruits of the plant that have been allowed to dry on the stalk*

Fernlike *leaves are used as a herb*

Powder
Dill seed is available ground, but don't get it confused with "dill weed," a name the dried herb is sometimes sold under.

Whole
The oval, brown-beige seeds look very similar to fennel seeds. They have little aroma until crushed and ground.

Spice story

Evidence suggests that the seeds and fronds of the dill plant were used for medicinal purposes in Egypt as early as 3000 BCE, and the ancient Greeks appreciated dill's digestive and sedative properties. The seeds were first used as a seasoning and flavoring for vinegars and pickles in Scandinavia and in central and eastern Europe. By the Middle Ages, dill was a common culinary herb, and was also used in witchcraft, love potions, and as an aphrodisiac. Kosher dill pickles later became a dietary staple for Jews living in eastern Europe and in Russia, and were introduced to the US by eastern European Jewish immigrants in the late 1800s and early 1900s. Dill rapidly became an important commercial crop for the pickling industry in the US, although today most of that industry's seed supply comes from India.

Region of cultivation
Dill is native to southern Europe, the Middle East, and the Caucasus. It is now mainly grown in India, Pakistan, the US, and countries around the southeast corner of the Mediterranean.

Kitchen creativity

The flavor of dill seeds resembles a cross between anise and a milder version of caraway, having the latter's herby flavor with lemony overtones and a gentle woodiness. There is also a hint of bitterness.

BLENDING SCIENCE

The flavor profile of dill seeds is dominated by D-carvone, a terpene flavor compound, which is spicy with hints of menthol, rye, and aniselike licorice. The other significant flavor compound is citrus-scented limonene. There are also small amounts of bitter fenchone, and phellandrene, which has minty aromas.

D-CARVONE
spicy / menthol / licorice

LIMONENE
citrus / herby / turpentine-like

PHELLANDRENE
minty / spicy / citrus

pair with spices that contain carvone or pair well with its flavor:

- ⊕ **caraway** echoes the herbiness of dill, introducing pine and woody qualities
- ⊕ **anise** enhances the licorice notes of dill
- ⊕ **fennel** adds complexity to aniselike flavors and brings citrus notes through shared limonene

combine with other spices carrying limonene to boost citrus flavors:

- ⊕ **coriander** is a particularly effective pairing, adding warmth and floral notes
- ⊕ **cardamom** lends a sweet, penetrating mintiness
- ⊕ **ginger** is a good match for introducing pungent heat thanks to shared limonene, which also adds sweetness

combine with spices sharing phellandrene to foreground minty and lemony nuances:

- ⊕ **allspice** provides a sweet peppery warmth
- ⊕ **star anise** contributes earthy, floral notes, and an undercurrent of eucalyptus, as well as aniseed
- ⊕ **bay** adds fresh floral-herbal notes, penetrating eucalyptus, and slight bitterness

FOOD PARTNERS

- ⊕ **Apples** Caramelize apples in butter and sugar with dill seeds; good on its own or with roasted pork.
- ⊕ **Carrots, onions** Sprinkle over baked onions or honey-roasted carrots.
- ⊕ **Fish** Lightly toast seeds with cumin and coriander, coarsely grind, and rub over fish skin before grilling or roasting.
- ⊕ **Goulash** Swap caraway seeds for dill seeds in a paprika-spiced beef or pork goulash, served with sour cream.
- ⊕ **Flatbreads** Heat the seeds in melted butter or ghee and brush over flatbread before serving.

RELEASE THE FLAVOR

Dill benefits from toasting to create new flavor compounds from the interaction of sugars and amino acids. Both new and existing compounds dissolve poorly in water, however.

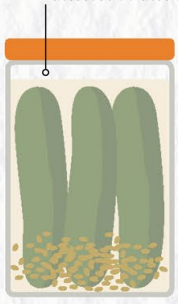
Toast seeds to create nutty and roasted flavor compounds, particularly pyrazines.

Cook in oil or fats to allow flavor compounds to escape.

Dill pickles

Although dill's flavor compounds do not dissolve well in water, the ample pickling time and fermentation process help the compounds to escape.

Compounds such as carvone and limonene dissolve in alcohol



Fermentation in low-temperature pickling produces alcohol to help disperse flavors.

EJJEH WITH ZUCCHINI, FETA, AND DILL AND BLACK LIME HARISSA

Ejjeh is a Lebanese omelette of fresh herbs and zucchini, usually spiced with a regional *baharat* (see pp.23 and 26), but enlivened here with North African *harissa* paste. In a twist on the paste's usual recipe, dill seeds replace caraway, black lime supplants preserved lemon, and the rich smokiness comes from chipotle instead of smoked paprika.

SPICE IDEAS

Try swapping dill for other spices on the **aniseed spectrum**, such as anise, star anise, allspice, or licorice.

Experiment with different **sweet–sour substitutes** for black lime, such as sumac, barberry, amchoor, anardana, tamarind, or lemon myrtle.

Draw on the **wide range of chilis** available, fresh and dried, to vary the degrees of heat, smokiness, and flavor complexity.

Serves 2–3

Prep time 10 mins

Cooking time 30 mins

For the harissa

5 large red chilis

1 red bell pepper

1 tbsp chipotle chili paste

½ tsp dried chili flakes

½ tsp cumin seeds, toasted and ground

½ tsp dill seeds, toasted and ground

2 large garlic cloves, crushed

1½ tsp red wine vinegar

3 tbsp olive oil

pinch of sea salt

½ tsp black lime powder

For the omelette

1 tbsp olive oil, plus extra for dressing

1 zucchini, grated

large handful Italian flat-leaf parsley, chopped

large handful mint leaves, chopped

1 tbsp harissa (use extra for more heat)

1 cup (200 g) feta cheese, drained and roughly chopped

sea salt and black pepper

4 large eggs, lightly beaten and seasoned with sea salt and black pepper

To serve

pita bread and a radish and green leaf salad, dressed in olive oil and *za'atar* (see recipe p.22)

1 First make the harissa paste: Preheat the oven to 400°F (200°C). Place the chilis and bell pepper on a lightly oiled baking sheet and roast in the oven – 15–20 minutes for the chilis, and around 30 minutes for the bell pepper – turning a few times until tender and lightly charred.

2 Remove from the oven and place in a sealed plastic bag for a few minutes to help to loosen the skin. Once they are cool enough to handle, pat them dry and peel. Seed the bell pepper and roughly chop, along with the chilis.

3 Blend the chilis and bell pepper in a food processor, then add the rest of the harissa ingredients and blend until smooth. Dilute with a little water if the mixture is too thick. Transfer to a small, clean glass jar, seal, and store in the refrigerator. You will have enough harissa for 15 tablespoons, and it will keep for about a week in the refrigerator.

4 Now make the omelette: Set the grill to high heat. Place a medium frying pan over medium heat, add the olive oil, and cook the grated zucchini for 4–5 minutes, stirring, until it starts to soften and turns slightly golden.

5 Sprinkle over the herbs, dot the harissa around, and then add the chopped feta and a grind or two of black pepper. After 30 seconds, pour in the eggs and cook for 3–4 minutes, until the base is firm but the top is still liquid. Transfer to the grill and cook for 1–2 minutes, until the omelette is risen but still slightly gooey.

6 Serve stuffed into pita bread with a *za'atar*-dressed radish and green leaf salad.

ANNATTO

Peppery | Earthy | Sweet

BOTANICAL NAME
Bixa orellana

ALSO KNOWN AS
Achiote, bijol, lipstick tree, *roucou*, *urucu*

MAIN FLAVOR COMPOUND
Germacrene

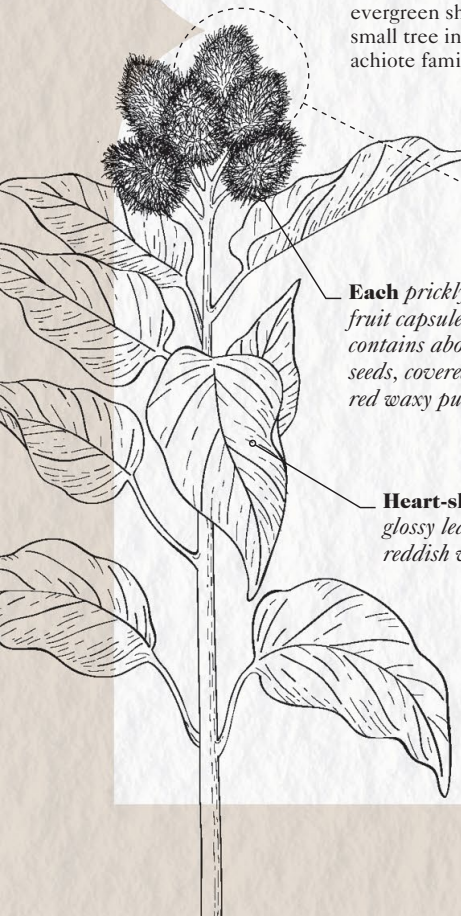
PARTS USED
Seeds

METHOD OF CULTIVATION
Seed pods are harvested when ripe pods have split to reveal the triangular seeds.

COMMERCIAL PREPARATION
The ripe pods are dried, then beaten with sticks to remove the seeds, and finally carefully winnowed by hand or machine.

NON-CULINARY USES
Fabric dye; coloring agent in cosmetics and medications; in traditional South American and Ayurvedic medicine.

The plant
Annatto is a tropical evergreen shrub or small tree in the achiote family.



Each *prickly red fruit capsule contains about 50 seeds, covered in red waxy pulp*

Heart-shaped *glossy leaves with reddish veins*

Seeds *are bright red in colour and yield a vivid orange-yellow dye*

Whole
The angular seeds are too hard to grind without a very powerful blender, and should be removed before serving. Store for up to three years.

Powder
Ground annatto has a fainter aroma and milder flavour, but is easier to use and yields colour faster than whole seeds. The powder has a shelf-life of one year.

Spice story

This New World spice, sometimes called "poor man's saffron," has been used as a natural dye for centuries. The Mayan Indians of Central America made a red paste from the brightly colored seeds to paint on their bodies in preparation for battle. Annatto was also used by early Aztec civilizations as a ceremonial pigment, and apparently as a means of protecting the skin from sunburn. The Aztecs added annatto to hot drinks to color their mouths red—hence the common name "lipstick tree." By the 17th century, this spice had arrived in Europe and was being used as a food coloring agent. It subsequently became a popular means of giving cheese and smoked fish products an attractive golden-orange color—a practice that continues to this day.

Region of cultivation
Annatto is native to the Caribbean and tropical South America. It is also cultivated in the Philippines, Sri Lanka, India, Africa, and Asia.

Kitchen creativity

Often employed solely for its staining ability, annatto is not just about color, and can bring a peppery, slightly citrus, almost smoked-earth flavor to dishes.

BLENDING SCIENCE

The gently flavored terpene family of compounds provide much of annatto's taste, in the form of germacrene, elemene, and copaene, all of which possess an underlying sweetness. The contrasting peppery, bitter edge to annatto comes from caryophyllene.

GERMACRENE
woody / sweet / spicy

ELEMENE
citrus / sweet / fir needles

COPAENE
honey / woody / spicy

CARYOPHYLLENE
peppery / dry / bitter

partner other spices with traces of this main compound:

⊕ **juniper** brings a pinelike fruitiness that also works with elemene

⊕ **asafetida**'s onion flavors are rounded off by germacrene's sweet notes

enhance citrus notes with another tart spice:

⊕ **coriander** enhances sweet, lemon fruit qualities, bringing in floral notes

⊕ **sumac** will reinforce the citrus quality of elemene

use sweet spices to draw out underlying honey:

⊕ **cinnamon** is similarly sweet, fragrant, and woody

⊕ **allspice** lends warmth and spice to the mix

⊕ **clove** has notes of camphor that also suit the fir-tree flavors of elemene

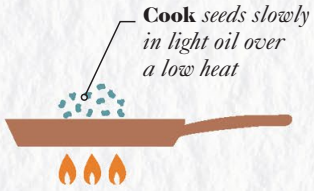
reinforce the lingering pepperiness:

⊕ **black pepper** shares caryophyllene and germacrene, and has a flavor profile that includes citrus and pine

⊕ **grains of Selim** have a peppery smokiness and share germacrene

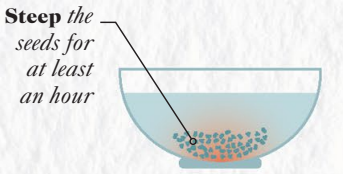
RELEASE THE FLAVOR AND COLOR

Whole annatto gives the best flavor, but the hard, dense seeds need time for the flavor molecules to escape, and must be removed before serving. For these reasons, it is best to cook with oil or water flavored by the seeds.



Infusing in oil

Annatto oil has a stronger taste because most flavor compounds dissolve best in oil. The oil-loving bixin pigment is plentiful, so cooking with fat will give the strongest coloring.



Steeping in water

Use more seeds than for infusing oil, as flavor compounds dissolve less readily in water, and the water-solvent norbixin pigment is four times less abundant than bixin.

FOOD PARTNERS

⊕ **Sweet corn** Drizzle annatto-infused oil over hot corn on the cob.

⊕ **Fish** Steep the seeds in hot oil and then use the oil to fry fish cakes or fritters.

⊕ **Meat** Use achiote paste in a marinade for chicken, pork, or beef before slow cooking and serving the meat "pulled" in tacos or tostadas.

⊕ **Rice** Use annatto-steeped water instead of saffron in Spanish rice with chicken.

⊕ **Chocolate** Add a pinch of ground annatto, cinnamon, and chili to chocolate mousse.

MASTIC

Pinelike | Resinous | Woody

BOTANICAL NAME
Pistacia lentiscus

ALSO KNOWN AS
Arabic gum (not to be confused with gum arabic), *mastiha*, lentisk.

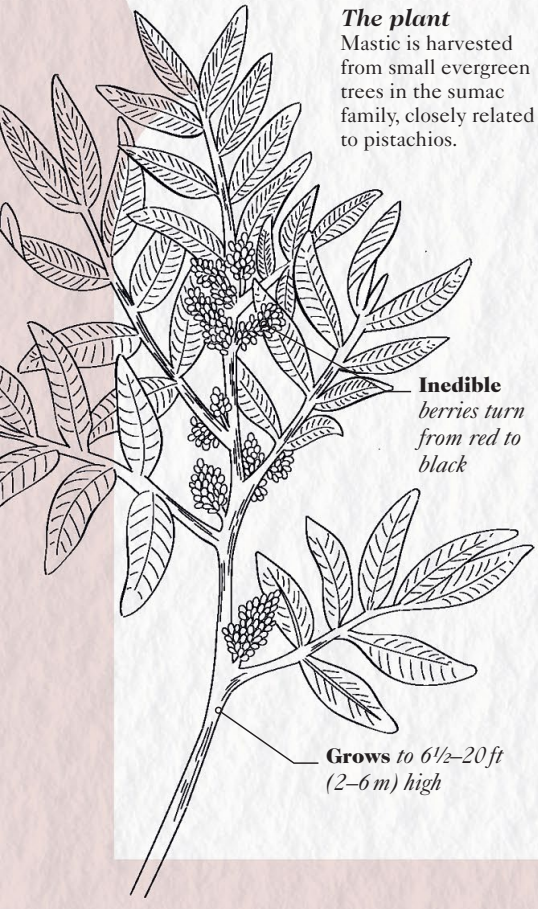
MAJOR FLAVOR COMPOUND
Pinene

PARTS USED
Resin

METHOD OF CULTIVATION
The tree's bark is scored in late summer to exude resin. Trees produce resin at 5 years and can continue for 60 years.

COMMERCIAL PREPARATION
Resin gradually hardens at the base of the tree into pear-shaped "tears," which are collected, cleaned, and dried.

NON-CULINARY USES
In cosmetics and perfumery; in traditional medicine for treating wounds.



The plant
Mastic is harvested from small evergreen trees in the sumac family, closely related to pistachios.

Color *is light ivory at first, darkening to golden-yellow due to reaction with sunlight and air*

Resin "tears"
Hard, translucent pieces are used in cooking and called *dahtilidopetres* (flint stones). Lower-grade, softer, larger tears are called *kantiles* (blisters) and are mainly used for chewing.

Spice story

The tree that produces mastic grows only on the Greek island of Chios, where this unique product has been cultivated for more than 2,500 years. The Ancient Greeks and Romans chewed it as a breath freshener—it is the origin of the word "masticate." When the Genoese took Chios from the Venetians in 1346 CE, they provided the islanders with protection from pirates in return for a monopoly over the lucrative mastic trade, which was by then a highly sought-after spice. In 1566, the Ottoman Turks seized control of the island and controlled mastic trade until Chios became part of the Greek state in 1913. Today, the 24 remaining mastic-producing villages—known as *mastichochoria*—harvest and process the resin in the same time-honored way. Chios mastic is now a product of Protected Designation of Origin (PDO) and most of it is exported to Turkey and the Middle East.

Region of cultivation
Mastic trees are native to the Mediterranean and the resin is harvested exclusively on the Greek island of Chios.

Kitchen creativity

In Turkey, mastic is added to Turkish delight; in Lebanon, it flavors a slightly chewy, eggless ice cream, scented with rosewater. In Egypt, it is added to red meat and poultry dishes, often along with cardamom.

BLENDING SCIENCE

Mastic's subtle aroma is mostly due to the flavor compound pinene, which comprises up to 80 percent of its chemical make up. Lesser amounts of myrcene and other terpene compounds give opportunities to partner mastic with a wide variety of savory, sweet, or woody spices.

PINENE
pinelike / penetrating

MYRCENE
peppery / light balsam

LINALOOL
floral / lilac

CARYOPHYLLENE
woody / bitter

add complexity to the dominant pine:

⊕ **nutmeg** brings a complex profile of orange, floral, and woody notes alongside shared pinene and the equally harmonizing camphene

boost pepperiness with myrcene-carrying spices:

⊕ **coriander** adds a refreshing citrus quality and shares many other compounds, making it a top match

⊕ **allspice** has a peppery sweetness and also shares floral aromas of linalool

draw out floral aromas:

⊕ **rose** brings a sweet-smelling raft of floral compounds

⊕ **cardamom**'s sweet minitness and penetrating eucalyptus, alongside linalool, also help balance out mastic's dominant pine flavor

use caryophyllene-carrying spices for more woodiness:

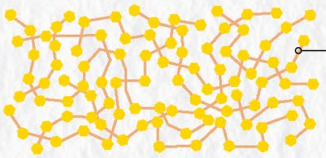
⊕ **cinnamon** also brings warming sweetness and floral fragrance

⊕ **clove**'s powerful eucalyptus-like eugenol also holds its own against mastic's pinene

Plastic mastic

Adding whole mastic to a cooking broth runs the risk of creating a gluey plastic paste stuck to the bottom of the pan.

Mixed with water, myrcene flavor molecules in mastic clasp on to one another very rapidly to form long chains, or polymers, which tangle together into a sticky mass.



Microscopically thin cables are similar to those found in natural and man-made plastics and rubbers

FOOD PARTNERS

⊕ **Fruit preserves** Add a little mastic to apple jelly or fig jam.

⊕ **Roast lamb** Rub a joint of lamb with mastic, crushed onion and garlic, and some cardamom before roasting.

⊕ **Bread** Add a teaspoon of ground mastic and some fennel seeds to a savory bread dough

⊕ **Sweet baked goods** Add mastic to macaroons—mastic pairs happily with almonds—or to rosewater-scented sponge cake.

⊕ **Rice pudding** Make a mastic-scented rice pudding and drizzle with an orange blossom–flavored syrup.

RELEASE THE FLAVOR

Mastic is best ground before use and mixed with another powdery ingredient so that it is dispersed throughout the dish.

Grind with sugar for a sweet recipe, or salt for savory dishes, or flour for either. This also stops the mastic sticking to the grinder.

Try adding mastic to dishes via a sauce made from a roux of flour, mastic, and butter or other fats.

JUNIPER

Resinous | Sharp | Floral

BOTANICAL NAME
Juniperus communis

ALSO KNOWN AS
Common juniper

MAJOR FLAVOR COMPOUND
Pinene

PARTS USED
Berries (actually cones, like those on pine trees, but with fleshy scales)

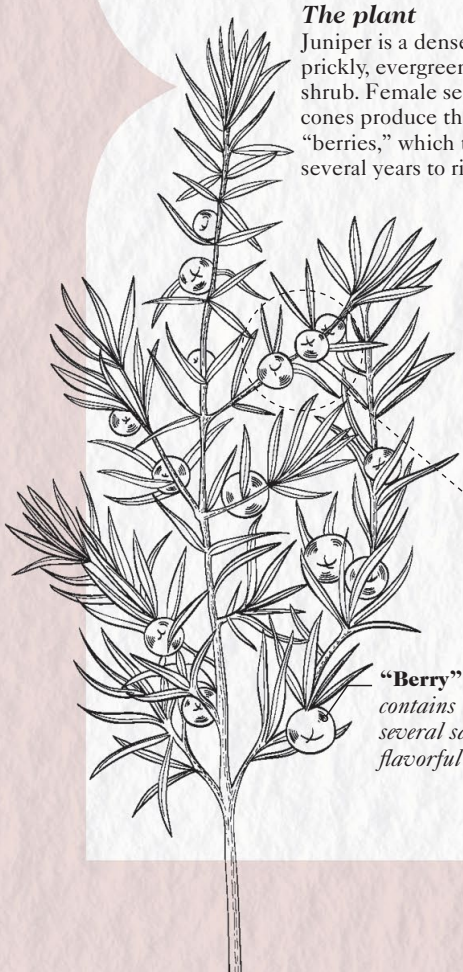
METHOD OF CULTIVATION
Shrubs are grown on chalky soils. Berries are harvested in late summer or autumn.

COMMERCIAL PREPARATION
Berries are often partially dehydrated at a temperature below 95°F (35°C) to limit the evaporation of essential oils, which contain the flavor compounds.

NON-CULINARY USES
In perfumes; as a fabric dye; as an insecticide. In traditional medicine, as a diuretic and anti-inflammatory.

Spice story

In folklore, juniper is associated with healing and magical powers, and the dense shrub is known as a place of safe refuge; in one legend the infant Jesus is concealed in a juniper hedge to hide him from King Herod's soldiers. Since ancient times, branches of the bush have been burned to smoke meat and fish, and in the Middle Ages the wood was burned to purify the air in times of plague. Italy has been exporting home-grown juniper for more than 500 years. Most of the country's crop goes straight to distilleries for making gin, and it is still a legal requirement for juniper to be the dominant aromatic in all gins. The Dutch in the 13th century appear to have been the first to flavor spirits with juniper, using the green, unripe berries to produce a strongly alcoholic drink they named *jenever*.



The plant
Juniper is a dense, prickly, evergreen shrub. Female seed cones produce the "berries," which take several years to ripen.

Ground
Berries are available roughly ground, but the flavor-containing oils soon degrade and the spice needs to be used quickly.

Whole
The berries are available fresh, but more commonly bought semi-dried. Store in a sealed container because the oils evaporate easily; best used within six months.

Region of cultivation
Juniper is native to temperate regions of Europe, Russia, and the Caucasus, North America, and Japan. The strongest-tasting berries are grown in warm, sunny, southern Europe.

Kitchen creativity

Juniper has a sweet taste with a strong aroma of pine and hints of turpentine. Its clean, citrus qualities make it particularly well suited to meat, on which its acids have a mild tenderizing effect.

BLENDING SCIENCE

Juniper's principal flavor—light, woody pine—reflects the coniferous tree from which it originates; fragrant terpene compounds make up 80 percent of juniper's flavor oils, with the pinewood aroma of pinene foremost. This range of pleasantly fragrant terpenes, combined with juniper's high sugar content (up to 33 percent), provide ample blending opportunities.

JUNIPER
Ju

PINENE
woody / spicy / camphoraceous

combine juniper's dominant pine with other complex spices featuring pinene:

⊕ **cumin** has a rich, heady aroma but with a strong pinewood background from pinene

⊕ **grains of Selim** have high levels of pinene, and contribute distinctive eucalyptus notes

⊕ **black pepper** highlights the pine aroma, while adding a peppery heat

ALPHA-TERPINEOL, TERPINEOL, AND MYRCENE
herby / spicy / woody

add clean herbal notes to strongly flavored terpenes:

⊕ **bay** contributes woody-tasting terpineol, alongside pinene and geraniol, making for a strong match

⊕ **cardamom**'s terpene compounds carry woody spice base notes, in addition to sharing limonene and geraniol

LIMONENE
citrus / herby / turpentine

draw out the citrus notes with another limonene:

⊕ **lemon myrtle**, which also has floral hints of linalool, will bring an intensely sweet citrus taste

GERANIOL
floral / sweet / lingering

highlight the fresh floral notes with geraniols:

⊕ **nutmeg** also contains terpineol and pinene for a woody and earthy depth

⊕ **coriander** also contains pinene and myrcene, making it a great fit

⊕ **ginger** has both sweet and lemon flavors, which can both be brought out

FOOD PARTNERS

⊕ **Cabbage, beets** Add crushed berries to coleslaw, along with slivers of tart apple; mix with salt and sprinkle over beets before roasting.

⊕ **Citrus fruits** Flavor citrus preserves with a couple of crushed berries, or top lemon sorbet with a small pinch.

⊕ **Meat** Use in marinades, rubs, and stuffing for most meats, particularly game. Drop crushed berries into casseroles and stews, with a strip of orange peel.

⊕ **Salmon** Juniper's resinous qualities work well with oily fish: include it in a homemade cure for salmon gravlax.

⊕ **Chocolate** Stir crushed berries into a truffle or mousse cake mixture.

RELEASE THE FLAVOR

Juniper berries don't need roasting, but do benefit from crushing or grinding to speed the rate at which the terpene-rich oils spread through a dish.

Crush berries just before using them; compounds soon evaporate when the oil sacs are broken.

Terpenes from the oil dissolve poorly in water but spread easily through oil and alcohol.

Meat rubs of crushed juniper give a strong taste as the surface fats disperse the flavors.

ROSE

Floral | Musky | Sweet

BOTANICAL NAME
Rosa x *damascena*
(most commonly used species)

ALSO KNOWN AS
Damask rose

MAJOR FLAVOR COMPOUND
Geraniol

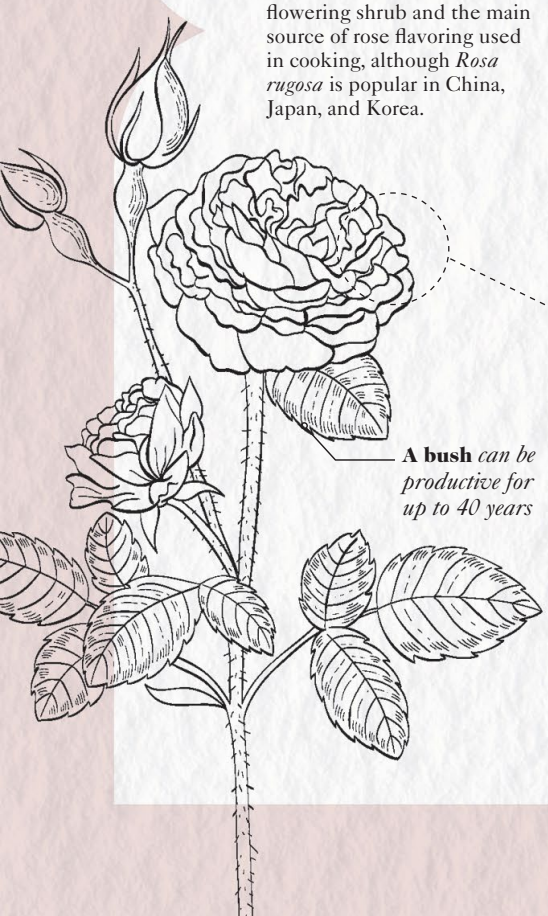
PARTS USED
Dried buds or petals

METHOD OF CULTIVATION
Buds and flower heads are harvested by hand. For petals, they are picked before or at sunrise on the first day in full bloom.

COMMERCIAL PREPARATION
Buds and petals are dried to sell as a spice, or distilled to produce rose oil.

NON-CULINARY USES
In perfumery and cosmetics; in traditional herbal medicine as an antidepressant and antiseptic, and to treat anxiety.

The plant
The damask rose is a hardy flowering shrub and the main source of rose flavoring used in cooking, although *Rosa rugosa* is popular in China, Japan, and Korea.



A bush *can be productive for up to 40 years*

Petals ➤

➤ Buds

Petals and buds
These are available dry for use as a spice, or crystallized for decorating cakes and desserts.

Spice story

The rose was first cultivated about 5,000 years ago by the ancient civilizations of China, who prized the flower for its beauty, perfume, and healing properties. The Romans grew roses extensively and documented their medicinal uses, including (when worn as a floral crown) protection from hangovers. In the 7th century CE cultivation of roses spread throughout the Middle East. Around this time the Persians discovered how to extract oil from the flower, and its culinary use became more widespread. By the Middle Ages, roses were used at medieval banquets to perfume water for hand washing, and to flavor savory and sweet dishes. During the Crusades, the highly scented damask rose, the main source of rose oil, reached northern Europe. In Victorian England, rose-petal sandwiches were considered a refined teatime treat.

Region of cultivation
The rose is native to temperate regions of the northern hemisphere, probably originating in China; the damask rose is native to the Middle East. It is cultivated in Turkey, India, Iran, Bulgaria, and Morocco.

Kitchen creativity

Rose petals add sweet floral aromas to both sweet and savory dishes. The petals of any unsprayed scented rose can be used, but those cultivated specifically for consumption have a more potent flavor than garden roses.

BLENDING SCIENCE

Rose's flavor profile is dominated by terpene flavor compounds that have a sweet, floral character, including geraniol, nerol, eugenol, and linalool. The unique rose aroma is produced by potent flavor compounds called "rose ketones," which provide fresh green notes, herby spiciness, woody sweetness, and berrylike notes.

ROSE
Ro

GERANIOL
floral / sweet / lingering

NEROL
orange blossom / sweet / fresh

EUGENOL
medicinal / woody / warming

LINALOOL
floral / woody / spicy

combine with other geraniol-carrying spices:

⊕ **ginger** adds pungent warmth and citrus notes, and also shares linalool

⊕ **nutmeg** used sparingly brings a warm, earthy spiciness, and also shares eugenol

combine with more nerol spices or those adding complex sweetness:

⊕ **lemongrass** lends citrus notes, mild pepperiness, and slight spiciness, also shares linalool

⊕ **vanilla** has rich, mellow creaminess and complex flavors that including subtle cherry notes

pair with other eugenol-rich spices to boost penetrating menthol nuances:

⊕ **allspice** provides sweet peppery flavors

⊕ **clove** adds sweet, astringent, eucalyptus-like notes

combine with other linalools to add floral complexity:

⊕ **cinnamon, cassia** contributes warming sweetness, with a touch of bitterness from cassia

⊕ **coriander** provides a powerful citrus spiciness alongside floral qualities

FOOD PARTNERS

⊕ **Cherries** Add to stewed cherries and use instead of jam in a tart.

⊕ **Vegetables** Add dried petals to harissa and serve with grilled vegetables.

⊕ **Chicken** Sprinkle crushed petals into a Moroccan-style chicken stew.

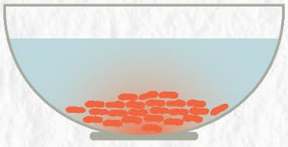
⊕ **Mackerel** Serve grilled mackerel with couscous scented with ground rose petals.

⊕ **Shortbread** Add a few crushed dried rose petals to the dough for shortbread cookies.

⊕ **Ice cream** Use ground petals or rosewater to make rose ice cream.

RELEASE THE FLAVOR

Rose's most potent flavor compounds are oil-soluble, but can easily overpower a dish: this is one spice that benefits from being used in a water-based way. Even so, rosewater contains several hundred flavor compounds, which give it a complex subtle flavor.



Make your own rosewater by steeping rose petals in water. Allow several days for the flavor compounds to slowly dissolve into the liquid.

BLEND TO TRY

Use and adapt this classic blend, suitable for sweet or savory dishes:

Advieh p.27

CORIANDER

Citrus | Floral | Warming

BOTANICAL NAME
Coriandrum sativum

ALSO KNOWN AS
Cilantro; sometimes mistakenly called Indian, Chinese, or Japanese parsley

MAJOR FLAVOR COMPOUND
Linalool

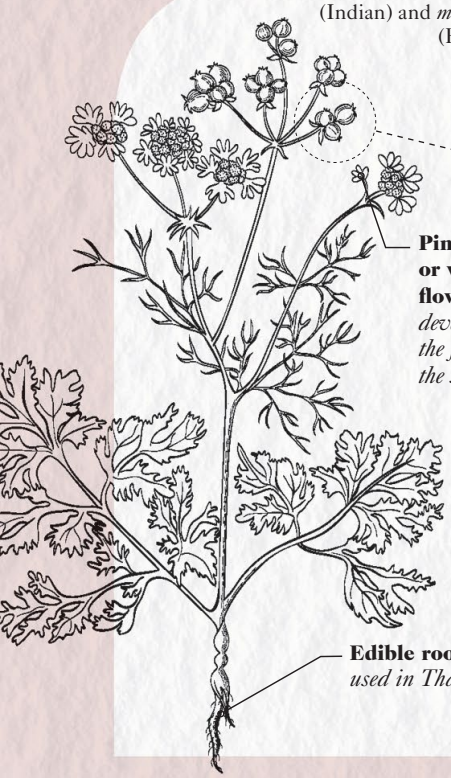
PARTS USED
"Seeds" (in fact fruits), leaves, and roots

METHOD OF CULTIVATION
Grown in fields as an annual crop; the fruits form on the plant about three months after sowing.

COMMERCIAL PREPARATION
Stalks are cut before the fruits are fully ripe. Fruits are threshed, cleaned and dried.

NON-CULINARY USES
Essential oil in perfumes and cosmetics. Also used as traditional remedy for ulcers and stomach problems.

The plant
Coriander is a hardy herbaceous annual plant. There are two main cultivated varieties: *vulgare* (Indian) and *microcarpum* (European).



Pink-tinged or white flowers *develop into the fruits of the spice*

Edible roots *are used in Thai cooking*

European

European fruits *have a higher essential oil content*

The husk *of each fruit contains two seeds*

Whole
The small, round European fruits are more citrusy than the larger, oval fruits of Indian coriander, which have a sweet and slightly creamy taste. Store for up to a year.

Indian

Powder
Pre-ground coriander loses its aroma quickly, and it is preferable to grind whole seeds as required. Store for up to four months.

Ground *coriander can also act as a thickener*

Spice story

The discovery of an 8,000-year-old stockpile of the spice in the Nahal Hemar cave in Israel, together with evidence from Egyptian tombs, suggests coriander has its origins as a commercial crop in the Near East. The Greeks and Romans used it as a medicine and a meat preservative, as well as a spice in dishes such as lentils with chestnuts. The spice traveled to India via Persia around 2,000 years ago, and four centuries later evidence points to its widespread use from China to Anglo-Saxon Britain. Early European settlers took the spice to North America, where it became naturalized and widely cultivated. By the 18th century, the spice had fallen out of favor in Europe, and its use became largely limited to gin distilling and beer brewing; it is still a popular flavoring in Belgian beers.

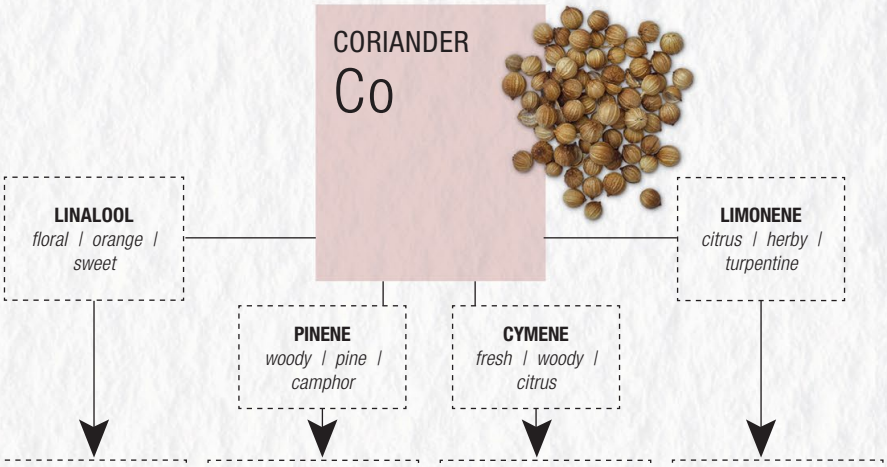
Region of cultivation
Native to the Mediterranean and southern Europe, coriander is now cultivated extensively throughout the world, for both seed and leaves. The main centers of production are in India and Russia, with large exports from Morocco, Romania, Iran, China, Turkey and Egypt.

Kitchen creativity

Coriander is a versatile spice with a bittersweet taste reminiscent of dried orange peel. While it can be used on its own, the spice is more frequently paired with earthy cumin to form the backbone of savory blends the world over.

BLENDING SCIENCE

Lilac-scented linalool dominates the flavor profile of coriander, followed by a variety of mildly flavored terpenes, including pinene, cymene, and limonene, making it a versatile spice for pairing.



FOOD PARTNERS

⊕ **Celery, fennel, cabbage** Toss a few crushed seeds into coleslaw or when braising.

⊕ **Citrus, apples, pears** Add toasted and ground to citrus sorbets and to crumble topping or pastry dough for apples and pears.

⊕ **Pork, game, chicken** Use as a dry marinade or rub, or in stuffing mixtures.

⊕ **Tuna and shellfish** Rub ground over tuna steaks before searing, or add whole to a court-bouillon for poaching shellfish.

⊕ **Preserves** Works well as a pickling spice, and in tomato relish and marmalade.

⊕ **Sponge cake** Add a pinch to plain sponge; it also works beautifully with citrus, blueberries, or blackberries.

BLENDS TO TRY

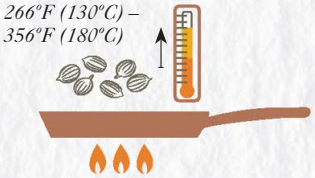
Try these recipes for classic blends featuring coriander, or why not adapt them with some blending science?

Zhug p.24
Dukkah p.28
Durban curry masala p.37
Malaysian fish curry paste p.51
Chimichurri p.66

RELEASE THE FLAVOR

Coriander's most flavorful oils are deep inside the seeds, and its taste profile changes greatly when the spice is toasted.

Leave untoasted to allow the green, floral flavors to dominate.



Toast to a deep brown color to develop nutty, earthy pyrazines.

Crack open or grind seeds to release the oils, especially for quick-cooking dishes.

WEST AFRICAN PEANUT CURRY WITH DURBAN MASALA

Inspired by the peanut soups and stews of West Africa, this recipe foregoes the usual fiery Scotch bonnet chilies for a twist from South Africa's Eastern Cape—a Durban curry masala spice blend. The heat comes mainly from the cayenne pepper, so use less for a milder kick. For a hearty soup, simply add more water at the end of cooking.

SPICE IDEAS

Blend your own masala: swap in black cardamom or grains of Selim, for smokiness, or replace ginger or coriander with woody, balsamic mace.

Toast the whole spices to **create new toasted pyrazine flavors**, but take care, as they can dominate.

Add fresh spices to the frying vegetables for a **deeper base flavor**: the pungency of garlic and ginger will mellow and sweeten with prolonged cooking.

Serves 6–8

Prep time 20 mins

Cooking time 25–35 mins

For the Durban masala blend

2 tsp cumin seeds
1 tsp coriander seeds
½ tsp fenugreek seeds
seeds of 5 cardamom pods
1 cinnamon stick
5 cloves
1 tsp cayenne pepper
½ tsp ground ginger

For the curry

4 tbsp unsweetened peanut butter
2¼ cups (500 ml) water
3 large carrots, peeled
2 parsnips, peeled
1 rutabaga or turnip, about 1 lb (500 g)
2 tbsp oil
1 medium onion, diced
1 tbsp tomato purée
2 ripe tomatoes, finely diced
12 oz (400 g) mushrooms, wild, cultivated, or mixed
2¼ cups (500 ml) vegetable stock
4 baby eggplants or white garden egg eggplants (optional)
salt and pepper to taste

1 For the Durban masala, grind the whole spices and combine with the cayenne pepper and ginger. Set aside.

2 Prepare the peanut butter by blending it with a cup of water in a food processor. Once it is smooth, pour into a pan and stir in the remaining water. Simmer on a low heat for about 15 minutes, until oil starts to gather on the surface. Set aside.

3 Chop the carrots, parsnips, and rutabaga or turnip into 1 in (2–3 cm) chunks. Heat 1 tablespoon of the oil in a large pan. Add the vegetables and fry over medium–high heat for 10–15 minutes, only stirring occasionally, until the sides brown and caramelize. Remove from the pan and set aside.

4 Heat the remaining oil in the pan and add the onion and masala. Sauté over medium heat for a few minutes, and then add the tomato purée and chopped tomatoes. Increase the heat to the maximum, add the mushrooms, and fry for 3 minutes.

5 Add the vegetable stock, peanut sauce, and vegetables to the pan. Chop the eggplants (if using) into 1 in (2–3 cm) chunks and add. Bring to a boil, then simmer for 15–20 minutes, until the vegetables are tender.

6 Check for seasoning and add salt and pepper. Remove any large, whole spices and serve the dish with sticky rice. Alternatively, to serve as a soup, add water and bring back to a boil.

CUMIN

Earthy | Herby | Woody

BOTANICAL NAME
Cuminum cyminum

ALSO KNOWN AS
Roman caraway, *jeera*

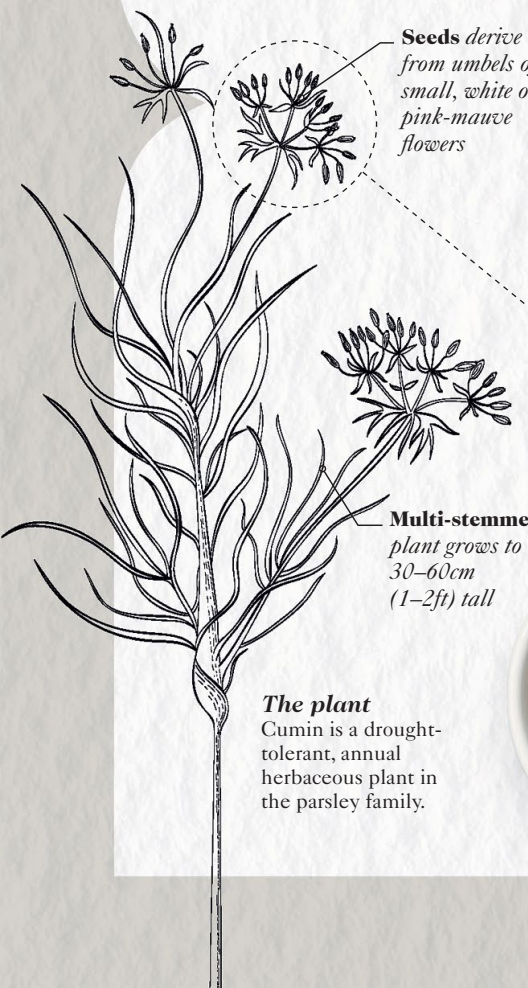
MAJOR FLAVOR COMPOUND
Cuminaldehyde

PARTS USED
"Seeds", which are technically fruits

METHOD OF CULTIVATION
Grown as an annual crop, plants are cut around four months after planting, when the fruits turn yellow-brown.

COMMERCIAL PREPARATION
Stalks are dried then threshed to separate fruits, which are then further dried.

NON-CULINARY USES
Essential oil in perfumes and veterinary medicines. In traditional medicine, taken to aid indigestion and relieve flatulence.



Seeds *derive from umbels of small, white or pink-mauve flowers*

Multi-stemmed *plant grows to 30–60cm (1–2ft) tall*

The plant
Cumin is a drought-tolerant, annual herbaceous plant in the parsley family.

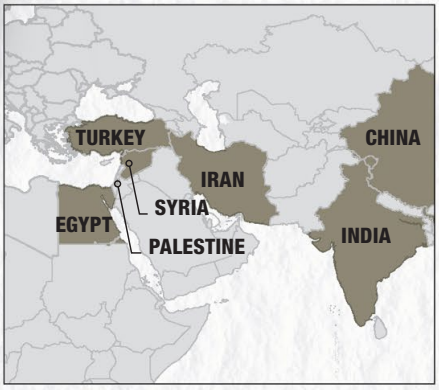
Seeds *measure around 6mm (¼in) long*

Whole
The boat-shaped, light brown seeds will keep their flavour for up to a year if stored in a sealed container somewhere cool and dark.

Powder
Buy ground cumin in small quantities, as it quickly loses its potency; use within a couple of months.

Spice story

Evidence of cumin in Egypt's pyramids suggests that it was in use more than 5,000 years ago. The Ancient Greeks and Romans used cumin as a table seasoning alongside salt. Roman naturalist Pliny the Elder regarded it as the king of condiments, and in modern-day Georgia and Africa salt combined with cumin is still a popular seasoning. From the 7th century CE, Arab traders transported cumin on their spice caravans to North Africa and east to Iran, India, Indonesia, and China, and it became a key component of many regional spice mixes, including *baharat* (Middle East), *garam masala* and *panch phoran* (India), and *ras el hanout* (Morocco). Spanish conquistadors introduced cumin to the Americas in the 16th century, notably to Mexico, where the spice became deeply embedded in the cuisine.



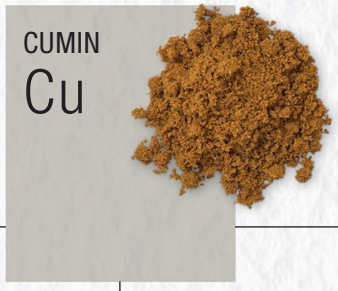
Region of cultivation
Thought to be native to Egypt's Nile Valley and the Eastern Mediterranean, cumin is cultivated in India (the largest producer and consumer), China, Syria, Turkey, and Iran. Palestine and USA are other producers.

Kitchen creativity

Cumin is an essential component of Indian, North African, Levantine, and Mexican cuisine. Used alone or in combination with other spices, it imbues a diverse range of savory dishes with its distinctive, highly aromatic, and pungent flavor.

BLENDING SCIENCE

Cumin's uniquely musky, earthy, almost burnt flavor derives from cuminaldehyde, a compound found in roast beef and cinnamon but sparingly in other spices. Oher important compounds include pinene, which gives the spice its dry, pinewood nuance, and cymene, which has a fresh, turpentine-like aroma.



CUMINALDEHYDE
bitter / herby / earthy

CYMENE
woody / citrus / harsh

PINENE
pine / fresh / conifer wood

pair with sweet spices to complement its tenacious warming qualities:

⊕ **cinnamon** and **cardamom** bring sweet warmth, and carry some cuminaldehyde

⊕ **nutmeg** matches well for warming muskiness, also sharing pinene

bring out woodiness with other pinenes:

⊕ **black pepper** adds warmth and enhances the mild pungency

⊕ **black cardamom**'s smokiness also works with cumin's earthy notes

use cymene to bridge with other spices' flavors:

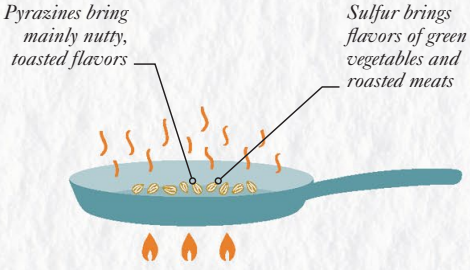
⊕ **coriander** provides zesty citrus and floral flavors, counterbalancing cumin's bitter earthiness

⊕ **ajwain** gives an intensely herbal thyme-like flavor

⊕ **nigella** adds a charred, mustard–onion spiciness

RELEASE THE FLAVOR

Cumin is particularly responsive to toasting: bruise and dry fry the seeds to produce additional flavor compounds of pyrazines and sulfur.



FOOD PARTNERS

⊕ **Eggplant and root vegetables** Toast and crush seeds for sprinkling over roasted eggplant, a beet dip, or puréed roots.

⊕ **Pulses** Use as a flavoring for dhal and other lentil stews, in falafel mix, and scattered over hummus.

⊕ **Beef and lamb** Add a pinch of ground cumin to minced lamb for Moorish-style kebabs, or to beef rendang, Mexican mole, and chili con carne.

⊕ **Salt** Toast seeds and then grind with an equal quantity of sea salt, for sprinkling over roast chicken, tomato salad, avocado toast, tacos, or roast potatoes.

⊕ **Yogurt** Combine cumin seeds, yogurt, and lemon to make a dressing for roasted vegetables or a salad of bitter leaves, such as mustard greens or kale.

BLENDS TO TRY

Try these recipes for classic blends featuring cumin, or why not adapt them with some blending science?

Turkish baharat p.23
Za'atar p.22
Advieh p.27
Dukkah p.28
Hawaij p.29
Chaat masala p.42
Shandong spice bag p.58
BBQ rub p.68

NIGELLA

Mild | Peppery | Herbaceous

BOTANICAL NAME
Nigella sativa

ALSO KNOWN AS
Love-in-a-mist, black onion seeds, black cumin, black caraway

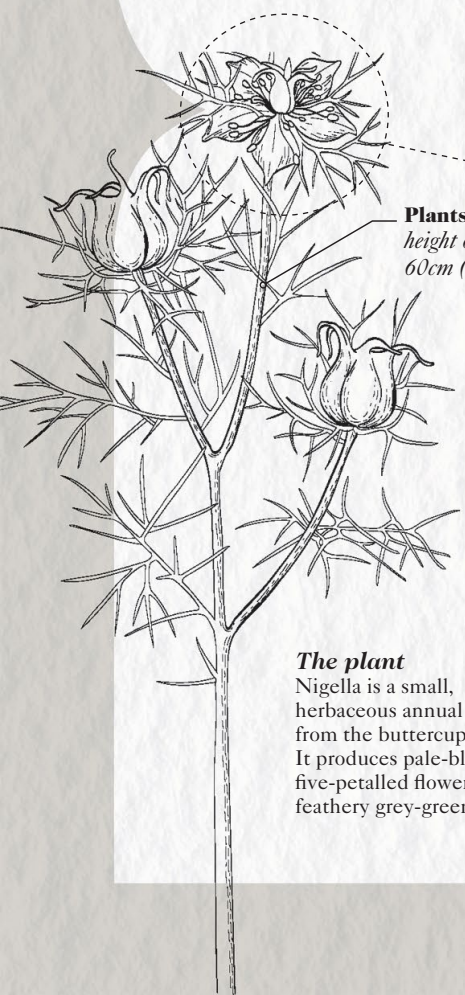
MAJOR FLAVOR COMPOUND
Nigellone

PARTS USED
Seeds

METHOD OF CULTIVATION
An annual plant, it produces large seed capsules that are harvested as they ripen.

COMMERCIAL PREPARATION
The capsules are dried, then gently crushed to release the seeds, which are sold whole or have their oil extracted.

NON-CULINARY USES
In natural remedies the seeds are used to alleviate cold symptoms, treat digestive ailments, and encourage lactation.



Plants *reach a height of about 60cm (2ft)*

Tear-drop shaped seeds *are beige until dried in air*

The plant
Nigella is a small, herbaceous annual plant from the buttercup family. It produces pale-blue, five-petalled flowers and feathery grey-green foliage.

Whole
Seeds will keep for up to two years. They are very hard, so grind them in a spice or coffee grinder rather than by hand with a pestle and mortar.

Spice story

Reputedly found in King Tutankhamun's tomb in Egypt, nigella has been cultivated for its seeds for more than 3,000 years. Its name derives from the Latin *nigellus* or *niger* (black). Ancient Greeks and Arabs appreciated the seed's curative and preservative properties; according to an Arab proverb, nigella is "a remedy for all diseases except death." An ancient Arab text describes it as *habbatul barakah*, "seed of blessing." while in the Old Testament it is called *ketzah*. The Roman physician and philosopher, Galen, prescribed nigella seeds to treat colds, and they are still used in this way: a spoonful of seeds is wrapped in muslin, held to the nostril, and inhaled to clear a blocked nose. Nigella has been used as an herbal remedy across southern Europe, western Asia, and the Middle East.

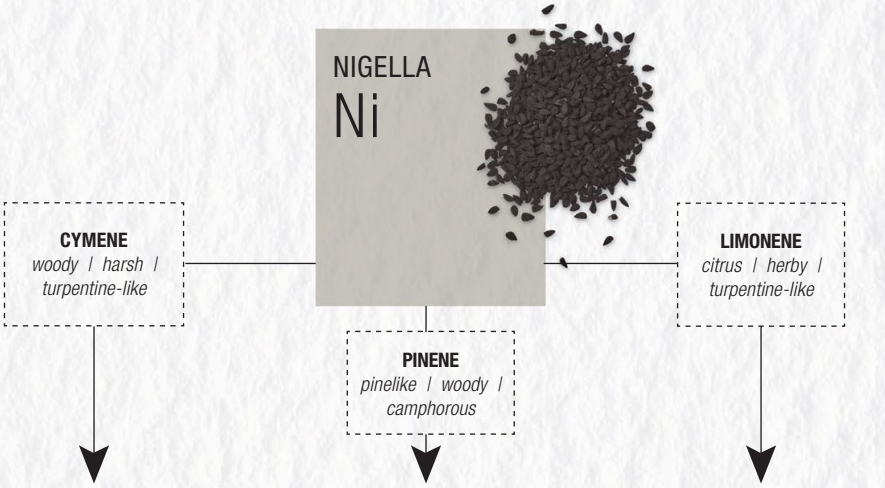
Region of cultivation
Native to southern Europe, Turkey, the Caucasus, and the Middle East, nigella is now cultivated in India—the largest modern-day producer—and Egypt, North Africa, and southern Asia.

Kitchen creativity

Nigella is a punchy spice that releases a mild heat on the tongue and has a slightly bitter, herby, charred onion–like flavor. It is widely used in Indian cooking and its preservative properties make it a fine pickling spice for fruit and vegetables.

BLENDING SCIENCE

Look to the secondary flavor compounds of nigella for effective spice pairings: significant concentrations of cymene give the spice its earthy, fresh aroma, and smaller amounts of the mild terpenes pinene and limonene are also present.



combine with other cymenes to enhance the fresh notes:

- ⊕ **ajwain**'s thymol tastes like oregano and links to nigella's herbiness, adding bitterness and menthol-like cooling
- ⊕ **cumin** brings a musky warmth
- ⊕ **nutmeg** used sparingly adds woody, warming spicy notes

additional pinenes bring depth to the pine elements:

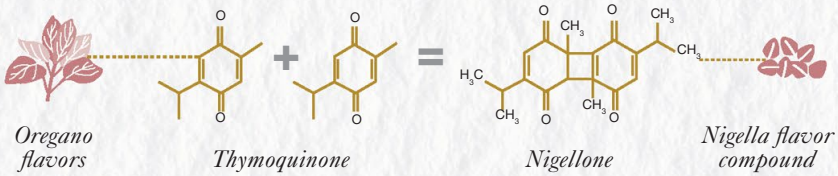
- ⊕ **black pepper** contributes mild pungency and bitterness
- ⊕ **cinnamon** enhances the woody qualities, introducing sweetness

pair with the fruity nuances of other limonenes:

- ⊕ **coriander**'s dominant floral citrus counterbalances nigella's onion-like bitterness
- ⊕ **caraway** brings aniselike, peppery pungency

The oregano connection

Nigella's main flavor compound—nigellone—is almost unique in nature, yet many people detect a similarity with oregano. The explanation is that nigellone forms from the sticking together of molecules of thymoquinone, a medicinal-tasting compound that is also found in oregano.

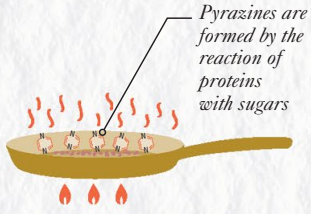


FOOD PARTNERS

- ⊕ **Vegetables** Add to vegetarian curries made with root vegetables, squash, or eggplant.
- ⊕ **Grains and pulses** Flavor rice and bulgur wheat with lightly toasted seeds; fry briefly in oil or ghee and stir into just cooked dhal.
- ⊕ **Eggs** Sprinkle over scrambled or fried eggs.
- ⊕ **Breads** Combine with white sesame seeds and stir into flatbread dough or sprinkle on top. Also works well with rye breads.
- ⊕ **Goat cheese** Work the seeds into a cheese dip made with whipped feta or other goat cheese.
- ⊕ **Lamb** Use in a slow-braised Indian korma or Moroccan tagine.

RELEASE THE FLAVOR

Nigella seeds are hard to break, and their flavorful oils are locked away in minute capsules. One way to help the oils escape is by grinding seeds, then toasting in a dry frying pan, which also generates additional pyrazine flavour compounds.



BLEND TO TRY

Try this recipe for a classic blend featuring nigella, or why not adapt it with some blending science?

Panch phoran p.43

GRAINS OF SELIM

Musky | Resinous | Bitter

BOTANICAL NAME
Xylopia aethiopica

ALSO KNOWN AS
Uda pod, Ethiopian pepper, *habzeli*, kimba pepper, *Selem kili*, Guinea pepper

MAJOR FLAVOR COMPOUND
Fenchone

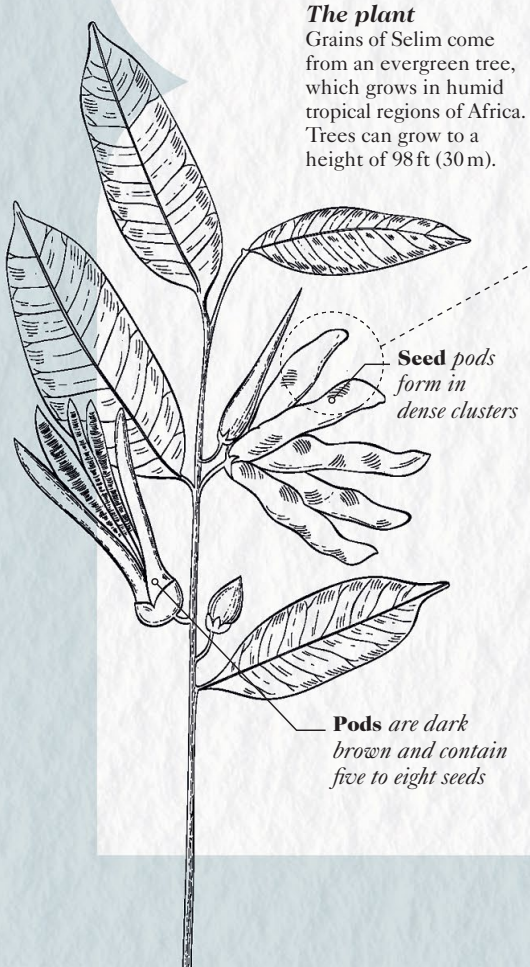
PARTS USED
Pods (fruits) and seeds

METHOD OF CULTIVATION
Trees are harvested for their pods, which are picked at various stages of maturity.

COMMERCIAL PREPARATION
In Senegal, immature fruits are smoked and then pounded; elsewhere, the sun-dried pods are ground or used whole.

NON-CULINARY USES
In traditional African medicine: fruit and/or roots are used to treat a variety of complaints. Bark extract is used in skin ointments.

The plant
Grains of Selim come from an evergreen tree, which grows in humid tropical regions of Africa. Trees can grow to a height of 98 ft (30 m).

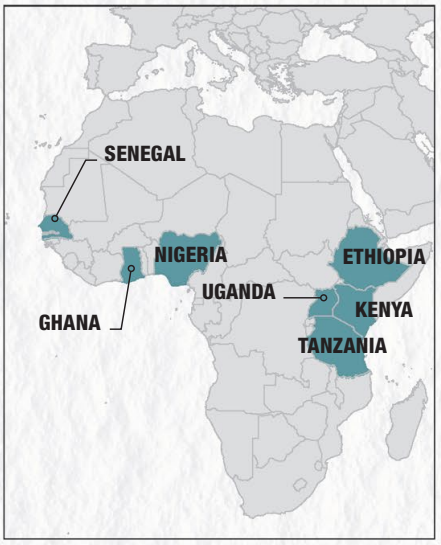


Whole
Pods can be used whole and removed from the dish before serving.

Powder
Grind your own pods and use immediately, since the flavors evaporate quickly and for this reason pre-ground powder is rarely available.

Spice story

Grains of Selim are a popular spice across Africa, from Ethiopia to Ghana. Like grains of paradise, during the Middle Ages the spice was exported north to Europe and sold as a substitute for scarce and expensive black pepper. However, its popularity in Europe waned from the 16th century—by then, Portuguese sailors and merchants had established sea trade routes from Asia to Europe, and this vastly improved the availability of black pepper and other exotic spices. Outside its indigenous regions, the spice is often called Ethiopian pepper, but it is no relation to *Piper nigrum*. It is valued as both a culinary spice and a medicine in Africa, particularly southern Nigeria, and deserves to be better known outside the continent.



Region of cultivation
The spice is native to Ethiopia and is cultivated there, as well as in Kenya, Uganda, Tanzania, Nigeria, Ghana, and Senegal.

Kitchen creativity

Whole pods add a raw pepperiness to soups, porridges, stews, and sauces, while the ground pods make excellent dry rubs for meat and fish. The whole pods are often tied in a muslin pouch so that they can be removed easily before serving.

BLENDING SCIENCE

The unique flavor of grains of Selim is due to a powerful and unusual compound called fenchone. You can also make interesting matches with its less dominating flavor compounds, such as vanillin, germacrene, linalool, geraniol, and pinene.

FENCHONE
bitter / penetrating / camphoraceous

LINALOOL AND GERANIOL
floral / sweet / herbal

VANILLIN
sweet / fragrant / creamy

GERMACRENE
woody / spicy / sweet

team with other powerful fenchones:

⊕ **fennel** has a strong licorice taste and accentuates pine flavour

⊕ **dill** carries more subtle anise flavors and adds hints of citrus

complement sweetness with fruity, tangy spices:

⊕ **juniper** is an excellent sweet match, sharing pinene and geraniol

⊕ **sumac** brings mouth-puckering sweet-sour notes

⊕ **licorice** contains intensely sweet glycyrrhizin and shares cineole

enhance woody notes with similar compounds

⊕ **nutmeg** and **mace** contain a woody compound called myristicin

add a fragrant floral spice to the mix:

⊕ **coriander**'s floral flavors are sweet and citrus infused

⊕ **cardamom** shares linalool, while penetrating cineole complements the lingering camphor notes

RELEASE THE FLAVOR

The main flavor compounds of grains of Selim dissolve and mix well in fats and alcohol, but less so in water-based liquids.

Cook briefly in fat before adding to a dish, or add toward the end of the frying time.

Add early when cooking in watery dishes, to allow time for flavors to infuse the dish.

FOOD PARTNERS

⊕ **Drinks** Use the ground spice to make the Senegalese coffee drink *café touba*.

⊕ **Vegetables** Add the ground spice to a vegetable curry of beans, tomatoes, and zucchini; sprinkle the ground spice over a spiced squash soup.

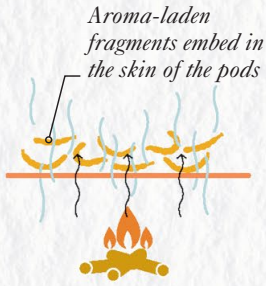
⊕ **Fish** Use the ground spice as a rub for fish, such as cod, before grilling, baking, or adding to a richly spiced gumbo.

⊕ **Meat** Make peppersoup, a West African soup containing grains of Selim, nutmeg, chili, and assorted meats.

⊕ **Rice** Add a whole pod to pilaf or biryani, or to Nigerian "one-pot" jollof rice.

MAXIMIZE THE SMOKINESS

Dried pods are smoked during drying to give a musky, wood-smoke aroma. Most of the smokiness is in the pods, so for the fullest smoky flavor grind the whole pods just before use.



Pleasantly fragrant molecules (particularly phenolics) are deposited by the rising smoke particles as they wash over the dry fruit.

BLEND TO TRY

Use and adapt this classic blend featuring grains of Selim.

Yaji p.36

BLACK CARDAMOM

Smoky | Camphorous | Resinous

BOTANICAL NAME
Amomum subulatum

ALSO KNOWN AS
Winged cardamom, large cardamom, brown or greater cardamom, black gold

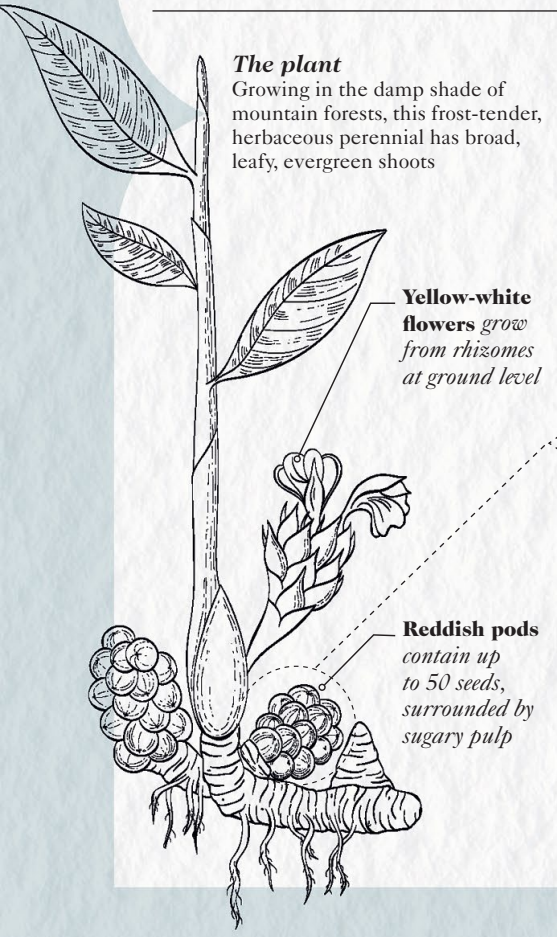
MAJOR FLAVOR COMPOUND
Cineole

PARTS USED
Seeds and whole fruit ("pod")

METHOD OF CULTIVATION
Grown in forest shade; the seed pods of three-year-old plants are hand picked from near the base, before they fully ripen.

COMMERCIAL PREPARATION
Pods are dried for 24–72 hours over an open fire in a curing kiln, which gives them their dark color and smoky taste.

NON-CULINARY USES
In perfumes and dental products; in traditional medicine for treating sore throats, stomach disorders, and malaria.



The plant
Growing in the damp shade of mountain forests, this frost-tender, herbaceous perennial has broad, leafy, evergreen shoots

Yellow-white flowers *grow from rhizomes at ground level*

Reddish pods *contain up to 50 seeds, surrounded by sugary pulp*

Seeds *are held in clusters inside the husk*

Pods *are about three times the size of green cardamom pods*

Black cardamom
Buy whole black cardamom pods (not ground seeds) and store in an airtight container for up to 1 year. Seeds begin to lose their flavor as soon as they are removed from the pods, so use immediately.

Chinese black cardamom
Also known as *cao guo*, these are the much larger pods of a different species of *Amomum*, but they have a very similar taste and can be used interchangeably.

Spice story

Black cardamom has suffered from an unwarranted reputation as an inferior substitute for its green cousin, and until the 20th century was mainly used for perfumes in the West. The spice has traditionally been cultivated by the Lepcha community of Sikkim, a state in Northeast India. The Sikkimese themselves use black cardamom for medicinal purposes and rarely cook with it, but in China its culinary value has been appreciated for centuries. The spice has only been cultivated outside Sikkim since the 1960s, when it was introduced to Nepal and Bhutan, then later still to Darjeeling in West Bengal. Now both areas cultivate it for domestic use, notably as a key constituent of garam masala spice blends, and, increasingly, for export to the Middle East, Japan, and Russia.

Region of cultivation
Native to the damp, hilly forest areas of the eastern Himalayas, from Nepal into China; up to 90 percent of black cardamom is still grown in the state of Sikkim in Northeast India.

Kitchen creativity

Black cardamom is best suited to slow-cooked, savory dishes. It is typically used in the braised meat dishes of Sichuan cuisine, in pho and other Vietnamese broths and soups, and in garam masala and pilafs of India and Nepal.

BLENDING SCIENCE

Black cardamom is dominated by the same penetrating cineole compound that gives green cardamom its flavor, but here the similarity ends. Varied smoky phenols, significant amounts of clovelike eugenol, pinelike pinene, and citrusy limonene, offer a wide range of pairing opportunities.

BLACK CARDAMOM

BI

CINEOLE
penetrating / eucalyptus-like

EUGENOL
medicinal / woody / warming

LIMONENE
citrus / herby / turpentine

add complexity to the dominant flavor with other cineole spices:

- ⊕ **allspice** provides a sweet, peppery warmth
- ⊕ **cardamom** gives a sweeter, more floral edge
- ⊕ **galangal** enhances the camphorous flavors

combine with other eugenols to counter the harsher notes of cineole:

- ⊕ **nutmeg** used sparingly adds warm, spicy notes
- ⊕ **cinnamon** contributes sweet, fragrant qualities

pair with more limonene to bring out fruity notes:

- ⊕ **coriander** also brings its strong floral flavor
- ⊕ **caraway** brings an additional aniselike taste that goes well with cardamom's smokiness

FOOD PARTNERS

- ⊕ **Bitter greens** Stir in a pinch of ground seeds when slow cooking bitter leafy vegetables, such as collard greens.
- ⊕ **Pickled vegetables** Whole pods work well in sweet or savory brines when pickling carrots, cucumbers, or tomatoes.
- ⊕ **Vegetarian stews** The char-grilled taste makes black cardamom a useful substitute for smoked bacon in stews and hot pots.
- ⊕ **Red meat** Add the bashed seeds to dry barbecue rubs for red meat.
- ⊕ **Chocolate** Sprinkle crushed seeds sparingly over dark chocolate mousse or over partially set chocolate when making chocolate bark or truffles.

BLENDS TO TRY

Try these recipes for classic blends featuring black cardamom, or why not adapt them with some blending science?

Garam masala p.40
Shandong spice bag p.58
Advieh p.27
Vindaloo paste p.44

RELEASE THE FLAVOR

Most of the smoky flavors are in the husk, so use whole pods if you want to retain the smokiness.

Toast whole pods or ground seeds to create nutty and roasted flavor compounds that interact with the smoky compounds.

Lightly crush whole pods before adding them early in cooking so that the full flavor can be infused into the dish.

Grind the seeds to release their flavorful oils for a more intense taste, but use immediately, as the oils quickly evaporate.

CARDAMOM

Eucalyptus | Citrusy | Floral

BOTANICAL NAME
Elettaria cardamomum

ALSO KNOWN AS
Small cardamom, green cardamom, true cardamom, queen of spices

MAJOR FLAVOR COMPOUND
Cineole

PARTS USED
Whole "pods" (fruits) containing seeds

METHOD OF CULTIVATION
Almost ripe seed pods are harvested by hand five or six times a year.

COMMERCIAL PREPARATION
Seed pods are washed and then dried in the sun or in heated "curing" rooms.

NON-CULINARY USES
Perfumery; cosmetics; in some cough drops; in Ayurvedic medicine to treat depression, skin conditions, urinary conditions, and jaundice.

The plant
Cardamom is a tropical perennial in the ginger family. Its tall shoots develop from rhizomes (underground stems).

Seeds
The seeds in good-quality cardamom pods should be black and slightly sticky. Avoid using seeds that are dry and pale.

Whole pods
The papery pods are normally yellowish green; white pods are bleached for aesthetic reasons, and have a weakened aroma.

Pods *are graded by width, with the fattest ones containing the most seeds*

Spice story

Cardamom has been used for culinary and medicinal purposes in India for more than 2,000 years. The spice was known by the ancient Greeks and Romans, who valued its qualities as a perfume and digestive aid. Vikings from northern Europe are reported to have encountered the spice during their raids on Constantinople in the 9th century CE, and to have taken it back to Scandinavia, where it remains a popular flavoring for breads and pastries. Cardamom began to be grown as a secondary crop in the coffee plantations of British India in the 19th century, and in 1914 the spice was introduced to Guatemala, which is now the world's largest producer. Around 60 percent of all cardamom is consumed in Arab countries, where it is a key ingredient of *gahwa*, a fragrant coffee served as a symbol of hospitality.

Region of cultivation
Cardamom is native to southern India and Sri Lanka, but Guatemala is now the world's largest producer, followed by India, Papua New Guinea, Sri Lanka, and Tanzania.

Kitchen creativity

This highly aromatic spice is sweet, somewhat minty, and penetrating, making it suitable for both sweet and savory dishes, and more versatile than black cardamom, which lacks sweetness and has a smoky aroma that may not work in desserts.

BLENDING SCIENCE

Cardamom's flavor profile is dominated by a powerfully penetrating eucalyptus-like flavor compound called cineole. It also contains a less common flavor compound, alpha-fenchyl acetate, which is sweet, minty, and herbal. In addition, there are significant amounts of several pleasant terpene compounds, including lemony limonene and delicately floral linalool.

CARDAMOM
Cm

CINEOLE
penetrating / eucalyptus / herbal

combine sparingly with other cineoles or eucalyptus-scented spices:

- ⊕ **black cardamom** contributes smoky, resinous aromas
- ⊕ **bay** adds a fresh woodiness and some bitterness
- ⊕ **grains of Selim** lend peppery notes
- ⊕ **allspice** and **nutmeg** offer a slightly subtler match with their eucalyptus scent and sweetness

ALPHA-FENCHYL ACETATE
sweet / minty / herbal

pair with another spice containing alpha-fenchyl acetate:

- ⊕ **galangal** adds powerfully aromatic flavors and enhances the eucalyptus quality through shared cineole

LIMONENE
citrus / herby / turpentine

give a boost to the lemon-like nuances:

- ⊕ **fresh ginger** provides harmonious sweet citrus notes

LINALOOL
floral / woody / spicy

enhance the gentle floral qualities with other linalools:

- ⊕ **coriander** provides pinelike qualities and shares citrus flavors
- ⊕ **lemongrass** adds a variety of floral flavors alongside fresh lemon

FOOD PARTNERS

- ⊕ **Apples** Add a small pinch of freshly ground cardamom to oven-baked apples.
- ⊕ **Rice** Sauté a couple of bruised pods lightly in oil, ghee, or butter before adding rice for a pilaf or biryani.
- ⊕ **Meat** Add a bruised pod to a creamy korma chicken curry or a lamb hot pot, to assuage the richness.
- ⊕ **Drinks** Steep a couple of bruised pods in black tea, coffee, liqueurs, or mulled wine.
- ⊕ **Baking** Sprinkle a pinch of freshly ground cardamom into a gingerbread mixture before baking.

BLENDS TO TRY

Use and adapt these recipes for classic blends featuring cardamom:

Turkish baharat p.23
Advieh p.27
Hawaij p.29
Durban curry masala p.37
Vindaloo paste p.44
Shandong spice bag p.58
Finnish gingerbread spice p.72

RELEASE THE FLAVOR

Whole pods give a subtle flavor and are suited to slow cooking, but always crush them before use. For a fresher, more intense flavor, and for quick-cooking dishes, remove the seeds and grind them.

Toast pods or seeds to add a bouquet of smoky, nutty, and roasted flavor compounds not previously present.

Crushing also helps cooking oils and liquid to reach the seeds

Lightly crush pods to open the husk and bruise the seeds, allowing flavorful oils to seep out from their storage cells.

Cook with fat in the dish, as most of the flavor compounds are almost insoluble in water.

BAY

Resinous | Herbal | Floral

BOTANICAL NAME
Laurus nobilis

ALSO KNOWN AS
Sweet bay, bay laurel

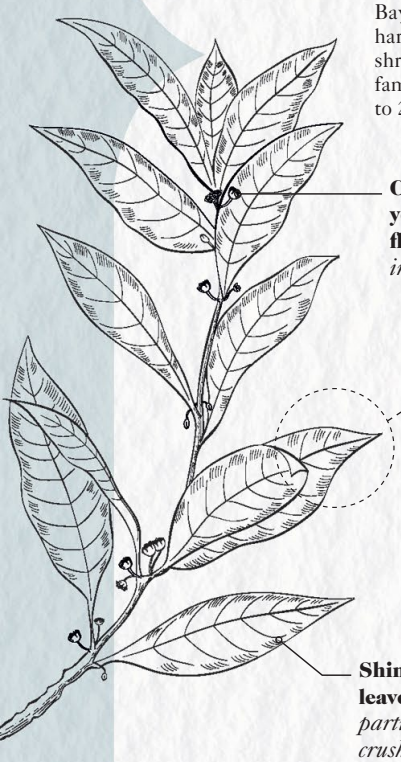
MAJOR FLAVOR COMPOUND
Cineole

PARTS USED
Leaves, and less commonly the berries

METHOD OF CULTIVATION
Leaves can be harvested at any time of year. Two- to three-year-old leafy shoots are cut off the main plant by hand.

COMMERCIAL PREPARATION
Shoots are dried in the shade. Leaves are then collected, graded, and packaged.

NON-CULINARY USES
Perfumery and cosmetics; in traditional medicine as a cough medicine and antiseptic, and to treat skin and joint problems.



The plant
Bay is a fairly hardy evergreen shrub in the laurel family. It grows up to 23 ft (7.5 m) tall.

Clusters of yellow-white flowers *develop in warm regions*

Shiny, deep green leaves *are aromatic, particularly when crushed or bruised*

Fresh
Fresh leaves are quite edible, but can be leathery, and have a slight bitterness that gradually dissipates.

Dried
Good-quality leaves remain pale green in color. They have less bitterness and little aroma, but the fragrance is released upon cooking.

Spice story

The ancient Greeks and Romans both regarded bay as symbolic of victory and high status. The Romans used bay leaves to flavor roasted meats, and added ground bay berries to stews and sauces. They also used bay leaves medicinally, and believed that garlands of the leaves would dispel evil spirits. The bay laurel was introduced from Asia Minor to all parts of the Mediterranean region in ancient times. By the Middle Ages it had reached right across Europe and continued to be ascribed spiritual significance. In the 17th century, the English herbalist Nicholas Culpeper wrote that a bay tree would provide protection from harm, and branches of the plant were burned in public spaces in times of plague.

Region of cultivation
Bay is native to the eastern Mediterranean region (Asia Minor). It is cultivated mainly in Turkey, which supplies more than 90 percent of the world market, but also across Europe, North Africa, Mexico, Central America, and southern US.

Kitchen creativity

Added at the beginning of cooking, fresh or dried bay leaves yield their fragrant, warm flavors gradually. Traditionally, bay is an indispensable part of a bouquet garni, tied in a bundle with thyme and parsley, and removed before serving.

BLENDING SCIENCE

The flavor profile of bay leaf is dominated by a terpene compound called cineole, which has an unusually penetrating, powerful eucalyptus scent. The next most abundant flavor compound is a spicy, sweet, warming phenol called eugenol. There are also small amounts of peppermint-like and slightly citrusy phellandrene, pinelike pinene and terpineol, and floral geraniol and linalool.

CINEOLE
penetrating / eucalyptus / herbal

EUGENOL
medicinal / woody / warming / sweet

PHELLANDRENE
minty / piquant / citrus

combine with other cineoles to complement the warm, woody pungency:

- ⊕ **black cardamom** brings smoky, penetrating flavors
- ⊕ **cardamom** enhances citrus and floral notes
- ⊕ **galangal** adds spiciness and enhances the warming quality through shared eugenol
- ⊕ **nutmeg** used sparingly adds a warm, woody aroma

pair with other eugenol-rich spices to boost sweetness and warmth:

- ⊕ **clove** adds sweetness and a woody bitterness
- ⊕ **cinnamon** lends a sweet, fragrant warmth
- ⊕ **licorice** strengthens sweet, eucalyptus-like notes
- ⊕ **rosewater** adds sweet floral notes

combine with other phellandrenes to bring out the piquancy:

- ⊕ **dill** adds aniselike aroma while sharing citrus qualities from limonene, and mintiness from carveol
- ⊕ **black pepper** imparts spicy heat and brings in background notes of pine

FOOD PARTNERS

- ⊕ **Vegetables** Thread whole, oiled leaves onto vegetable skewers for barbecuing or grilling.
- ⊕ **Apples** Add a whole bay leaf to the filling for an apple pie.
- ⊕ **Grilled meat** Throw fresh or dried bay leaves onto barbecue embers before grilling meat.
- ⊕ **Seafood** Stuff a few bay leaves into the cavity of a whole fish before baking, or add to steamed mussels and clams.
- ⊕ **Cannellini beans** Cook soaked cannellini beans in water with bay leaves for a ribollita or bean purée.
- ⊕ **Chocolate** Infuse cream with bay and combine with melted chocolate for an aromatic ganache.

BLENDS TO TRY

Try these recipes for classic blends featuring bay, or why not adapt them with some blending science?

Burmese garam masala p.48
Nanjing spice bag p.59
Mulling spice p.73
Khmeli-suneli p.77

RELEASE THE FLAVOR

Bay's flavor oils are deep within the leaf, which explains why dried leaves are still effective. Flavor compounds dissolve well in oil, fat, and alcohol, but poorly in water.

Use in water-based cooking liquids for a delicate flavor, and allow time for flavor compounds to spread into the dish.

1 small bay leaf to 3 tbsp oil is a good ratio for most dishes

Extract maximum flavor by adding to oil and heating gently before mixing with other ingredients.

GALANGAL

Warming | Pungent | Peppery

BOTANICAL NAME
Alpinia galanga

ALSO KNOWN AS
Greater galangal, Laos root, Thai ginger, Siamese ginger

MAJOR FLAVOR COMPOUND
Cineole

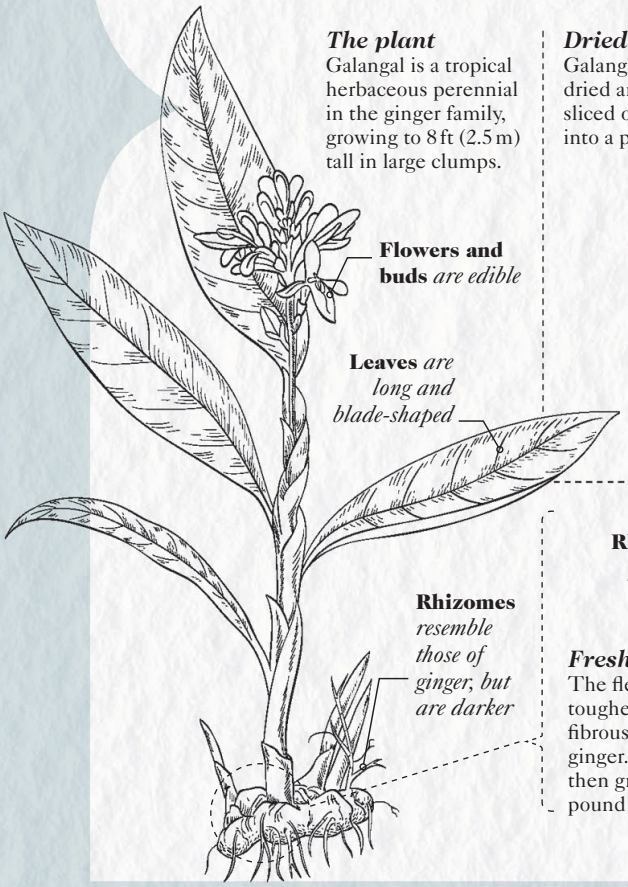
PARTS USED
Rhizomes (underground stems)

METHOD OF CULTIVATION
Grown as an annual crop, rhizomes develop clumps of green stalks and are harvested 3–4 months after planting.

COMMERCIAL PREPARATION
Rhizomes are washed, then cut up and scraped to be sold fresh, dried, or ground.

NON-CULINARY USES
Essential oil in perfumery; in traditional Ayurvedic medicine to boost appetite and treat heart and lung diseases.

The plant
Galangal is a tropical herbaceous perennial in the ginger family, growing to 8 ft (2.5 m) tall in large clumps.



Flowers and buds *are edible*

Leaves *are long and blade-shaped*

Rhizomes *resemble those of ginger, but are darker*

Dried
Galangal can be dried and either sliced or ground into a powder.

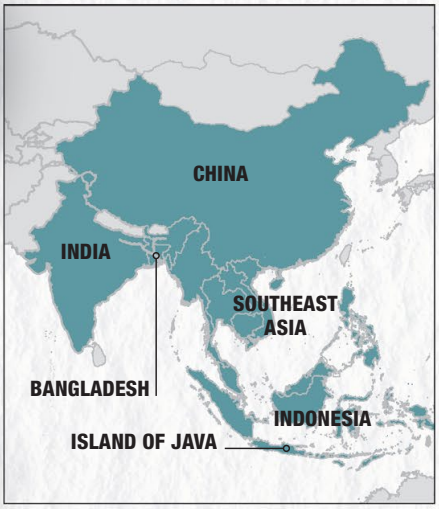
Dried slices *are best softened in water before use*

Rhizomes *look yellow-orange after scraping*

Fresh
The flesh is tougher and more fibrous than that of ginger. Peel it, and then grate, slice, or pound to a paste.

Spice story

The Greek philosopher Plutarch noted that the ancient Egyptians burned galangal as a fumigant, to perfume and disinfect the air. It was also used as a medicine by ancient civilizations from the Mediterranean to China. Greek and Roman physicians included the spice, brought from Asia on early trade routes, in their expensive concoctions for wealthy patients. In the Middle Ages, the German herbalist Hildegard of Bingen (1098–1179) described galangal as "the spice of life," but evidence suggests it was a different variety, known today as lesser galangal, that became popular in European cooking. It appears in a sauce recipe in *The Forme of Cury*, a 14th-century English cookbook, and in many other medieval and Tudor recipes. Today it is an important spice in Southeast Asian cuisine.



Region of cultivation
Galangal is native to Java, in Indonesia, but is now cultivated throughout Southeast Asia, India, Bangladesh, China, and Suriname.

Kitchen creativity

Galangal's flavor is an intriguing mix of cardamom, ginger, and saffron, with mustard and citrus notes. It has a reputation for heightening other flavors while retaining its own distinctive character.

BLENDING SCIENCE

Galangal's trademark lingering pungency comes from penetrating cineole and medicinal camphor, and unusual galangal acetate is responsible for its wasabi-like tang. Similarly uncommon methyl cinnamate and fenchyl acetate are often found in fruits, lending subtle notes of balsamic vinegar and fir tree, respectively.

CINEOLE
penetrating / eucalyptus / herbal

CAMPHOR
pungent / medicinal / bitter

METHYL CINNAMATE
balsamic / cherry / cinnamon

FENCHYL ACETATE
sweet / minty / herbal

intensify eucalyptus with cineole spices:

⊕ **bay** strengthens pine-fir notes, and complements the medical character

⊕ **cardamom** also brings minty notes from shared fenchyl acetate, as well as floral citrus aromas

find a match for this lingering compound:

⊕ **coriander**'s related camphene brings a cooling camphorous taste, while also adding floral and citrus flavors

pair with spices on the sweet spectrum:

⊕ **cinnamon** shares methyl cinnamate, bringing a woody sweetness

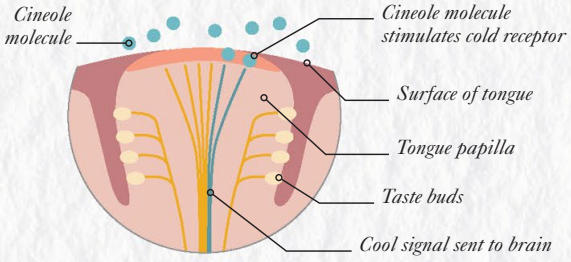
⊕ **clove** brings a heady sweetness and more woody spiciness from caryophyllene

partner with spices that complement this rare compound:

⊕ **dill** and **caraway** have minty nuances, but also add a background of lemon and mild anise

Cineole's cooling effect

Galangal's peculiar mouth-numbing coolness comes from cineole. This flavor compound has a molecular shape that directly stimulates a cold thermoreceptor, called TRPM8, which normally senses cold temperatures.



FOOD PARTNERS

⊕ **Meat** Add galangal paste to your base for a beef rendang, slow-cooked beef ribs, or chicken marinade. Simmer slices in beef or chicken stock to form a base for *pho*, the Vietnamese noodle soup.

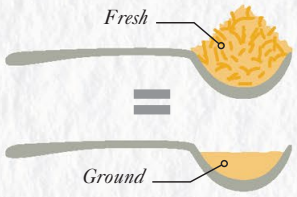
⊕ **Smoothies** Swap ginger for a smaller amount of galangal in your favorite fruit or vegetable smoothie.

⊕ **Fish and shellfish** Combine galangal and lemongrass with shallots, garlic, chili, and fish sauce to make a paste for Thai fish curry.

⊕ **Fruit** Grated galangal with lime juice, fish sauce, sugar, chili, and garlic makes a zingy dressing for green papaya or other fruit salads.

RELEASE THE FLAVOR

Fresh galangal is best grated or pounded to a paste; slices release flavor more slowly. Oils are essential for fullness of flavor. Powder is harsher and less complex than fresh spice because subtler flavor compounds evaporate with processing.



If substituting ground galangal, use half as much as fresh.

BLENDS TO TRY

Use and adapt these classic blends featuring galangal:

Khao kua p.49

Bumbu p.52

ASIAN LARB SALAD WITH CURRIED DUCK AND KHAO KUA

Popular in both Laos and Thailand, larb is a fiery salad most often made with finely minced meat or fish, which is flavored with fresh spices and herbs and topped with roasted rice powder. This version mixes things up by adding in garam masala—the warm, aromatic spice mix at the heart of much Indian cooking.

SPICE IDEAS

Reinvent the citrus sour in *khao kua* by replacing or enhancing lemongrass and lime leaves with lemon myrtle, sumac, or dried lime powder.

Instead of lime juice, **use tamarind water** in the dressing for a more lusciously fruity sweet–sour flavor.

Personalize the garam masala: create a more floral character with coriander and green cardamom; add fennel, dill, or caraway for underlying aniseed.

Serves 2–3

Prep time 10 mins

Cooking time 2–3½ mins

1 tbsp vegetable oil

2 tsp garam masala (see recipe p.40)

1 tsp Thai chili flakes, or any crushed dried chilis

2 duck fillets, skin removed, then minced

juice of 2 limes

2 tbsp Thai fish sauce (*nam pla*)

1 tbsp palm sugar or muscovado sugar

2 lemongrass stalks

4 shallots, finely sliced

handful fresh mint leaves, chopped

handful fresh cilantro leaves, chopped

1 tbsp *khao kua* roasted rice powder (see recipe p.49)

1 Heat the oil in a frying pan over a medium heat. Add the garam masala and chili flakes and stir-fry for 1–2 minutes, until fragrant.

2 Turn the heat to high and add the duck mince. Fry for 1–2 minutes, until the meat is browned on the outside but still pink in the middle. Transfer to a plate and set aside.

3 To make the dressing, mix the lime juice and fish sauce with the sugar in a large bowl. Stir until the sugar has dissolved.

4 Prepare the lemongrass stalks by trimming the tops and bases and peeling off the woody outer layers. Crush the pale green, tender inner stalks using the back of a heavy knife, to release the aromatic oils. Chop the stalks finely.

5 Add the warm duck, shallots, chopped lemongrass, mint, and cilantro to the bowl of dressing. Stir until all the ingredients are well combined.

6 Sprinkle the *khao kua* over the salad and serve immediately. If you are preparing the salad ahead of time, only add the rice powder when you are ready to serve, so that it stays crunchy.

DRIED LIME

Tangy | Sour | Musky

BOTANICAL NAMES
Citrus x *latifolia* or *C. aurantifolia*

ALSO KNOWN AS
Persian lime, noomi (*C.* x *latifolia*); Omani lime, loomi (*C. aurantifolia*)

MAJOR FLAVOR COMPOUND
Citral

PARTS USED
Dried fruits

METHOD OF CULTIVATION
Trees are grown in orchards and the fruits picked when slightly under-ripe.

COMMERCIAL PREPARATION
Fruits are boiled in brine and left to dry in the sun until they turn hard, darken, and begin to ferment.

NON-CULINARY USES
Used by Arabian Bedouins as black fabric dye; in traditional medicine to stimulate digestion and reduce bloating.

The plant
Limes grow on small, evergreen trees in the citrus family, native to tropical and sub-tropical regions.

Fruits *are picked when mature, but still pale green*

Leaves *are aromatic and sometimes used in cooking*

Powder
Lime powder is made from grinding dried black limes and tastes similar to sumac.

▲ *White lime*

Black lime ➤

Peel *is leathery*

Whole
Black limes have had longer to ferment and develop stronger, musky flavors. The paler types are dried for a shorter time.

Spice story

Limes are native to Southeast Asia and were brought to the Middle East by Arab traders, though exactly how and when is unclear, since lemons and limes were often referred to by the same name in Arabic texts. By the 10th century CE, Arab traders had introduced the fruits to Egypt and North Africa, and from there they spread across southern Europe during era of the Crusades. Limes first made it to the Americas in the 16th century, planted in the West Indies by European explorers. The practice of drying limes first developed in Oman. Some believe the idea suggested itself after unharvested fruits dried on the trees and began to ferment. Used in cooking throughout the Middle East, dried limes are most closely associated with Persian cuisine.

Region of cultivation
The most important lime producers for the Middle Eastern market are Egypt, Turkey, and Israel. The preparation of dried limes is carried out in Oman, Saudi Arabia, Iraq, and Iran.

Kitchen creativity

Limes are the most acidic of all citrus fruits, but they carry a fragrant, floral quality that is unique in the citrus family. The process of drying limes develops vinegary, earthy qualities, a hint of smoke, alongside mild fermented flavor.

BLENDING SCIENCE

Some acids break down into sugar, meaning dried lime is less powerfully sour than fresh lime, allowing its other flavors to shine. Pair with spices that also highlight its subtle woody, camphorous, floral, and sweet notes.

CITRAL, LIMONENE
citrus / herbal

add more citrus complexity:

⊕ **ginger**'s lemony qualities from shared citral synergize with lime, while gingerol adds zesty heat

⊕ **cardamom** has a eucalyptus flavor and shares citrus limonene, sweetness from herby a-fenchyl acetate, and floral linalool

LINALOOL
floral / woody / spicy

emphasize similarly floral notes:

⊕ **nutmeg** adds the floral aromas of safrole and geraniol

⊕ **allspice**'s main compound, eugenol, has an intensely perfumed presence

⊕ **coriander** shares both limonene and linalool, echoing lime's citrus/floral balance

METHOXY-COUMARIN
sweet / balsamic

boost sweetness through similar coumarin:

⊕ **vanilla**'s aromatic sweetness resembles coumarin, bringing indulgent flavors to sweet dishes if balanced well

⊕ **mahleb** intensifies sweetness with almond, creamy, cherry pie nuances

FENCHONE
bitter / camphorous / warming

use fenchone-carrying spices for a tang of camphor:

⊕ **cassia**'s bitterness, penetrating taste, tannins, and sweet coumarin balance the acidity of dried lime

⊕ **grains of Selim** also add floral and pine flavors with linalool and pinene

⊕ **fennel**'s subtle aniseed works well with the bittersweet qualities of dried lime

FOOD PARTNERS

⊕ **Fruit salad** Swap lemon juice for ground dried lime in a syrup for a fruit salad.

⊕ **Vegetables** Add a whole dried lime to the base of an Iranian chickpea and vegetable stew, after softening onions, carrots, and garlic.

⊕ **Fish** Introduce powdered dried lime to a fish curry, or over grilled shellfish or sea bass.

⊕ **Chicken** Pierce a dried lime and place it in the cavity of a chicken before roasting, or add to the poaching broth for chicken, along with turmeric, saffron, and onion.

⊕ **Grains** Use ground dried lime to flavor rice dishes and pilafs, or sprinkle over a quinoa or bulgur wheat tabbouleh salad.

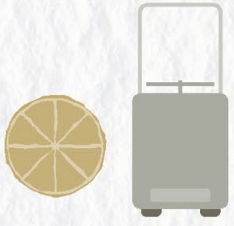
RELEASE THE FLAVOR

Unlike the eye-watering hit of fresh limes, the complex flavors of whole dried limes need coaxing out, although powder can offer an imperfect shortcut.

Pierce whole limes with a skewer before adding to a dish: the flesh gradually rehydrates to release flavors.

Fats and alcohol release fragrant terpenes in the peel. Methoxycoumarin, acids, and sugar dissolve in water, hence low-fat dishes are sweet and tart, but lacking in aroma.

Lime powder is best for quick-cook dishes. If using in slower dishes, add later so the terpenes have less time to evaporate.



Grind in an electric grinder, first cutting in half and removing the seeds.

LEMON MYRTLE

Citrusy | Warm | Bitter

BOTANICAL NAME
Backhousia citriodora

ALSO KNOWN AS
Sweet verbena tree, lemon ironwood

MAJOR FLAVOR COMPOUND
Citral

PARTS USED
Leaves (fresh or dried)

METHOD OF CULTIVATION
Leaves are harvested all year round, by mechanical harvesters or by hand.

COMMERCIAL PREPARATION
The leaves are separated from their stems and then dried using drying machines. They are packaged whole or ground.

NON-CULINARY USES
Cosmetics and perfumery; in herbal medicine for its antibacterial and antioxidant properties; topical antiseptic.

The plant
Lemon myrtle is an evergreen tree in the myrtle family, and is related to allspice and clove.

Flowers *and berries are edible but not sold commercially*

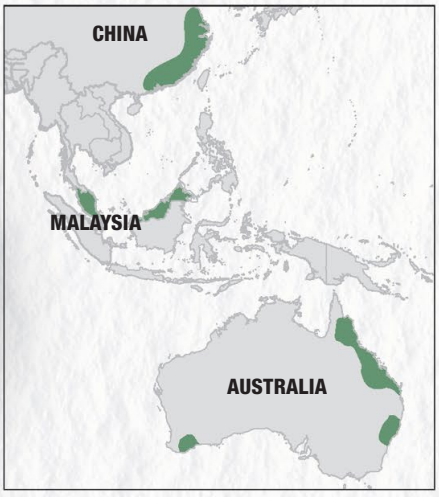
Leaves *are thick, glossy, and strongly lemon scented*

Good-quality powder *has a green hue; avoid brown powder*

Powder
Lemon myrtle is most readily available to buy as coarsely ground or crushed dried leaves. It degrades rapidly in sunlight and warmth, so must be stored in cool, dark conditions.

Spice story

The potent aromatic foliage of the lemon myrtle tree has long been prized—possibly for millennia—by aboriginal Australians, who use them in cooking and to treat cuts. The leaves were first distilled for essential oil in 1888, and during World War II an extract from the lemony leaves was used as a substitute for commercial lemon essence, supplies of which had become scarce. However, it was not until the early 1990s that lemon myrtle, by then a potentially lucrative crop for the food and drink industry, began to be cultivated as a spice. Demand is now outstripping supply, and plantations have been established outside Australia. Since 2010, lemon myrtle has been under attack from myrtle rust, a fungal infection, which could threaten this species in the long term.



Region of cultivation
Lemon myrtle is native to coastal subtropical rainforests of Queensland, Australia. It is grown in some subtropical areas of Australia (mainly in Queensland and northern New South Wales), Malaysia, and China.

Kitchen creativity

Lemon myrtle has a bright citrus flavor—more lemony than lemon, but without the acidity of that fruit's juice—with green, herbal notes and a subtle scent of eucalyptus. Add sparingly to both sweet and savory dishes.

BLENDING SCIENCE

The leaf oil of lemon myrtle consists almost entirely of citral—a lemon-scented flavor compound that is up to 30 times more concentrated in this spice than in lemon rind. Alongside are small amounts of floral linalool, peppery myrcene, and the green-tasting ketone sulcatone.

LEMON MYRTLE
Lm

CITRAL
citrus / herbal / eucalyptus

pair with spices that heighten or complement the lemon component:

- ⊕ **lemongrass** adds mild pepperiness and slight spiciness
- ⊕ **wattle** contributes sweet, nutty, lightly charred wood flavors with hints of popcorn
- ⊕ **cacao** adds notes of bitter chocolate
- ⊕ **chili** contributes mouth-warming pungency

LINALOOL
floral / woody / spicy

pair with other linalool-carrying spices to reinforce the floral qualities:

- ⊕ **cinnamon** contributes sweet warming notes
- ⊕ **ginger** adds sweet pungent warmth and citrus notes

SULCATONE
green / apple / musty

enhance refreshing green flavors with another leafy spice:

- ⊕ **bay** has green undertones from hexanal and brings in penetrating and complex pine and floral aromas

MYRCENE
peppery / spicy / balsamic

combine with spices that harmonize with the peppery notes:

- ⊕ **Sichuan pepper** adds warming and tantalizingly tingly notes
- ⊕ **black pepper** contributes warmth and woodiness
- ⊕ **allspice** lends sweet warmth and also pepperiness

FOOD PARTNERS

- ⊕ **Garlic and oil** Infuse olive oil with garlic and lemon myrtle for use in salad dressings and marinades.
- ⊕ **Squash** Combine with cracked black pepper and sprinkle over roasted squash.
- ⊕ **Oily fish** Mix crushed lemon myrtle with sea salt and sprinkle over salmon or trout before grilling or barbecuing.
- ⊕ **Lamb** Adapt an Egyptian dukkah (see p.28) with lemon myrtle and macadamia nuts for seasoning roasted lamb.
- ⊕ **Baking** Drizzle lemon-myrtle–infused syrup over a quince, pear, or plum cake, or use the syrup in a sorbet. Boost the lemony taste of lemon meringue pie with a pinch of lemon myrtle in the filling.

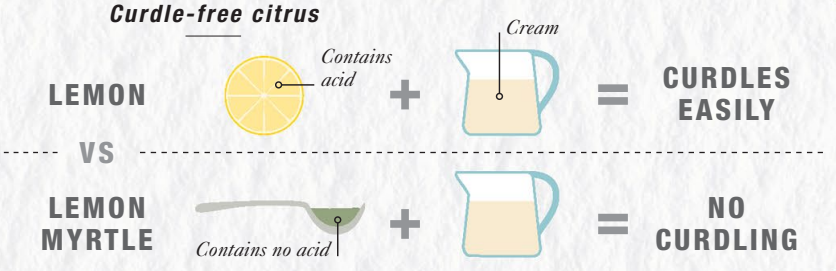
RELEASE THE FLAVOR

Citral is unstable and breaks down over time, allowing camphor and eucalyptus notes to dominate. The compound does not dissolve in water.

Add toward the end of cooking or use in recipes with only a short cooking time. Ensure fats are included in the dish.

Curdle-free citrus

Acids present in the juice of lemons and other citrus fruits cause protein molecules in dairy products, such as milk and cream, to clump together, resulting in curdling. Lemon myrtle does not contain acids, so can be added to milk- or cream-based sauces and desserts to give them an intense lemon-lime flavor without any risk of curdling.



LEMONGRASS

Citrusy | Peppery | Refreshing

BOTANICAL NAME
Cymbopogon citratus

ALSO KNOWN AS
Serai, oil grass, West Indian lemongrass

MAJOR FLAVOR COMPOUND
Citral

PARTS USED
Stalks, leaves

METHOD OF CULTIVATION
Around three times a year, the whole clump of leaf bases and young stems are hand-cut at the base of the plant.

COMMERCIAL PREPARATION
Stems are separated, cleaned, and trimmed to lengths of 8 in (20 cm), and then bundled for drying or using fresh.

NON-CULINARY USES
In perfumes, soaps, and toiletries; in insect repellents; anti-inflammatory medication; as a fungicide; and to relieve joint pain.

The plant
Lemongrass is a member of the grass family and grows in warm, tropical climates to a height of 5–7 ft (1.5–2 m).

Narrow, tapering leaves *grow from the bulbous base*

Aromatic oils *are concentrated in the stems*

Powder
Dried, ground lemongrass (also called *sereh*), imparts only a fraction of the spice's complex character.

One teaspoon *is roughly equivalent to a stalk of lemongrass*

The most *tender inner part of the stem can be eaten raw*

Fresh
Store well wrapped in the refrigerator for up to 2 weeks. Leaf blades can also flavor dishes: tie in a knot and gently bruise.

Spice story

The Latin name for lemongrass, *Cymbopogon*, derives from the Greek words *kymbe* (boat) and *pogon* (beard), referring to the shape of its flowers, now rarely present in cultivated varieties. The spice has been used both medicinally and as a flavoring agent in its native Asia for thousands of years. In 10th-century China it was used as an insect repellent, the fragrant leaves being placed on beds to ward off fleas. By the Middle Ages, lemongrass had made its way to Europe from Asia via caravan spice routes—the spice appears in several brewing and spiced wine recipes of the time. In the 19th century, India began cultivating lemongrass, mainly to export the aromatic oil for scenting soaps and cosmetics. However, it was Southeast Asian rather than Indian cuisine that adopted lemongrass as a staple spice.

Region of cultivation
Lemongrass is cultivated throughout the tropics, in India, Sri Lanka, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Australia, the Americas, and West Africa.

Kitchen creativity

Delicate lemongrass enlivens curries, stir-fries, pickles, salads, and soups. Use the tender inner stalk in curry pastes, marinades, and spice rubs, or bruise the whole fibrous stalk and use in stocks or soups, removing it before serving.

BLENDING SCIENCE

Lemon-scented citral makes up 70 percent of the spice's flavor compounds, but the key to spice pairing is to avoid intensifying this dominant citrus with another lemony spice. Instead, bring out lemongrass's mild pepperiness from myrcene, and/or its sweet and floral elements from linalool and geraniol.

CITRAL
citrus / herbal / eucalyptus

MYRCENE
spicy / peppery / turpentine

LINALOOL AND GERANIOL
floral / woody / sweet

team with spices where citrus is a minor part of the flavor profile:

⊕ **coriander** contains similarly lemony limonene and powerfully magnifies floral notes

⊕ **ginger** contains citral and brings in hot pungency

boost the peppery notes with spicy myrcenes:

⊕ **black pepper** also brings slow-burning heat, and harmonizing floral and citrus notes from flowery linalool and citrus limonene

⊕ **allspice** is also sweetly fragrant, making it ideal for sweeter dishes

harmonize penetrating spices through shared floral compounds:

⊕ **cardamom** shares linalool, with complementary eucalyptus and lemon

⊕ **Sichuan pepper** shares geraniol, linalool, and myrcene under its cineole pungency

⊕ **grains of Selim** carries both compounds, plus eucalyptus and bitterness

RELEASE THE FLAVOR

Most of lemongrass's flavor comes from oil glands deep inside the grass. The stems must be crushed to burst open the glands and release the oils.

Slice, grate, or pound for quicker cooking: the greater the damage, the faster the oils will leak out. Add powder late in cooking.

Gently bruise or bend leaf blades for lengthy cooking, to prevent too many of the flavor compounds evaporating.

Cook with fats, such as coconut milk, to ensure oil-based citrus and floral flavor compounds spread throughout the dish.

FOOD PARTNERS

⊕ **Fish cakes** Make Thai fish cakes by adding lemongrass, chili, ginger, garlic, and lime leaves to fish and potatoes before frying.

⊕ **Pork** Marinate pork in a paste of finely chopped lemongrass, ginger, coconut, and turmeric before grilling or barbecuing.

⊕ **Granita** Infuse a sugar syrup with lemongrass and lime zest. Strain to make granitas or ice pops.

⊕ **Salad** Add finely chopped lemongrass to a dressing for a Thai noodle salad with slivers of carrot, chili, cucumber, and a handful of toasted nuts and herbs.

⊕ **Fruit** Instead of adding pared lemon peel to the poaching liquid for pears, rhubarb, quince, or peaches, add a bruised stick of lemongrass for a hint of pepperiness.

BLEND TO TRY

Try this recipe for a classic blend featuring lemongrass, or why not adapt it with some blending science?

Khao kua p.49

AMCHOOR

Citrus | Herbaceous | Bittersweet

BOTANICAL NAME
Mangifera indica

ALSO KNOWN AS
Mango powder, amchur

MAIN FLAVOR COMPOUND
Ocimene

PARTS USED
Flesh of unripe fruits

METHOD OF CULTIVATION
Unripe mangoes are harvested mechanically or by hand.

COMMERCIAL PREPARATION
Fruits are peeled, sliced, and oven- or sun-dried to remove 90 percent of their moisture, then packed as slices or ground.

NON-CULINARY USES
In Ayurvedic medicine to treat respiratory diseases and digestive complaints.

The plant
Mango is a large tropical evergreen tree in the cashew family.

Powder
Amchoor powder has a coarse texture and is light beige in color. It can be stored for up to a year in a sealed container away from sunlight.

Whole
Dried slices are light brown and resemble rough-textured wood. Store in a sealed container in a cool, dark place for up to 4 months, and grind as needed.

Spice story

Mangoes have been cultivated in India for more than 4,000 years, and are strongly linked to the Ayurvedic system of traditional Indian medicine. According to Hindu folklore they also have sacred properties, and Ganesh, the Hindi elephant-headed god, is often shown holding a ripe mango as a symbol of attainment. Buddhist monks took mangoes to East Asia in the 4th and 5th centuries CE, and the fruit was subsequently transported west along trade routes, reaching Africa in around 1000 CE and northern Europe by the early 14th century. The fruit was introduced to Brazil by Portuguese explorers in the 17th century, and also reached Mexico via the Philippines. In the mid- to late 18th century, mangoes reached the West Indies, probably via Brazil.

Region of cultivation
Mangoes are native to India and Myanmar, and over 40 percent of the total world crop is cultivated in India. Other major producers include Pakistan, Bangladesh, China, Thailand, Indonesia, the Philippines, and Mexico.

Kitchen creativity

Amchoor has a fruity, very tart but slightly resinous taste, with a citrus tang. It is often used as a souring agent, much like lemon but with the benefit of not adding moisture. Use it judiciously, as the bittersweet flavor can be overpowering.

BLENDING SCIENCE

As well as pairing with the following spices that share the same or similar fruity, herbal, and vegetable-like flavor compounds, take advantage of the sweet and puckering qualities of amchoor by pairing with galangal and ginger, or the sweetly aromatic nutmeg and cinnamon.

AMCHOOR
Am

OCIMENE
floral / vegetal / tropical

CUBEBENE
lemony / fruity / radishlike

CADINENE
herbal / woody / spicy

pair with other spices that share this main compound:

- ⊕ **nigella** lends an onion-like savoriness
- ⊕ **grains of Selim** add a camphorlike sweetness
- ⊕ **annatto** brings a peppery edge
- ⊕ **bay** has penetrating fruit-floral aromas

combine with other sharply fruity spices:

- ⊕ **sumac** has a similarly sweet-tart citrus profile
- ⊕ **coriander** also brings a floral bitterness

enhance woody notes with spices that share this gentle terpene:

- ⊕ **juniper** brings a sweet pinelike woodiness
- ⊕ **carob**'s sweet vanilla notes will foreground amchoor's fruitiness
- ⊕ **asafetida** pairs well despite its very different, predominantly sulfurous and musky taste

Concentrated sweet-and-sour taste

Drying the mango evaporates most of its water, reducing its moisture content from over 80% to less than 10%. In the process, the acids, sugars, and flavor compounds become highly concentrated, resulting in a distinctly sweet-and-sour taste profile.

One teaspoon of amchoor powder has the acidity of three tablespoons of lemon juice.

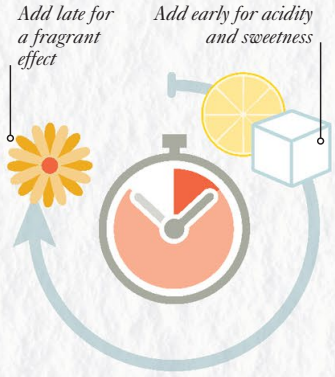
Fruit sugars are concentrated during drying to around 65%.

FOOD PARTNERS

- ⊕ **Fish and prawns** Add to a crumb or batter coating for fried fish or prawns.
- ⊕ **Lamb** Use amchoor to make a marinade for lamb chops, shoulder, or shanks. Rub it over the meat and leave it overnight before grilling or slow roasting; the acidity works as a tenderizer.
- ⊕ **Lentils** Stir into a soothing dhal to add a touch of piquancy.
- ⊕ **Vegetables** Sprinkle over roasted cauliflower, or add a pinch to stir-fried eggplant or okra.
- ⊕ **Tropical fruit** Add a pinch to a sweet tropical fruit sorbet or salad.

RELEASE THE FLAVOR

Many of amchoor's terpene flavors quickly evaporate, but the fruit sugars do not. Citric acid also boils less easily than water, which means its sweet–tart effect will increase with prolonged cooking.



BLENDS TO TRY

Use and adapt this recipe for a classic blend featuring amchoor:

Chaat masala p.42

ANARDANA

Sweet | Sour | Fruity

BOTANICAL NAME
Punica granatum

ALSO KNOWN AS
Pomegranate

MAJOR FLAVOR COMPOUNDS
Citric acid and malic acid

PARTS USED
Fruitlets (incorrectly called seeds)

METHOD OF CULTIVATION
The fruit is cut off the tree when fully ripe, but before it splits open.

COMMERCIAL PREPARATION
The seeds and pulp are separated from the bitter white membrane and dried in the sun.

NON-CULINARY USES
The seeds and rind are widely used in Indian, traditional European, and Middle Eastern medicine to reduce fever, aid digestion, and as an anti-inflammatory.

The plant
Anardana comes from the fruits of a large flowering shrub in the loosestrife family. It is deciduous in temperate climates but evergreen in some tropical regions.

Slow-dried fruitlets *are reddish-brown to black in color*

Dried fruitlets
Consisting of seeds surrounded by the fleshy aril (pulp), these are slightly soft, sticky, and semi-moist.

Powder
Dried fruitlets are also available ground into powdered form.

Spice story

The pomegranates has been grown for at least 5,000 years, making it one of the oldest cultivated fruits, probably originating in and around Persia (now Iran). By the early Bronze Age, cultivation had spread throughout the southern Mediterranean and eastward to India and China. Its abundant seeds made the pomegranate an enduring symbol of fertility in many ancient cultures, notably Egypt, where pomegranate motifs can be found in temples and tombs. In the Greco-Roman period, physicians prescribed it to treat tapeworm, and the Roman recipe book *Apicius* contains a recipe for a digestive pomegranate drink supposedly enjoyed by Emperor Nero. The culinary home of the dried spice in particular remains, as it has for millennia, in Indian and Persian cuisine.

Region of cultivation
Pomegranate is native to and mainly cultivated in the Middle East, Turkey, the Caucasus, and India, and also in Southeast Asia and in China.

Kitchen creativity

Anardana is popular in northern India, where it is used as a souring agent in curries, pakoras, and chutneys. Many Iranian dishes—such as *fesenjan*, a chicken and walnut stew—combine the spice with pomegranate molasses for a richer flavor.

BLENDING SCIENCE

Pomegranate's tangy fruitiness primarily comes from its mix of acids, sugars, and tannins. The compounds giving its appetizing aromas range from "green" hexanal and citrusy limonene to peppery myrcene and sweet, turpentine-like carene. These compounds are pivotal when looking for suitable spice partners.

ANARDANA

Ar

HEXANAL
green / fruity / grassy

CARENE / SUGARS
sweet / pungent / turpentine-like

LIMONENE
citrus / herby / turpentine-like

MYRCENE
peppery / spicy / woody

boost the green notes with another hexanal:

⊕ **barberry**, like pomegranate, has a high acid content that produces a sour fruitiness

add complexity to the citrus flavors:

⊕ **ginger** contains lemony citral, adding a pungent heat dimension

⊕ **tamarind** is an ideal partner, sharing lemony notes and adding bready and floral ones

bring out more subtle pepperiness:

⊕ **black pepper** shares myrcene and deepens spicy flavors with pungent piperine

⊕ **cumin** is an ideal partner, bringing warming, savory earthiness

lift the sweetness:

⊕ **vanilla** adds a creaminess and complex character

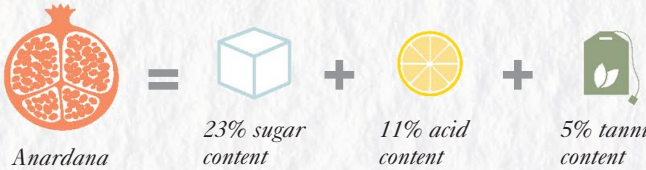
⊕ **mahleb** has cherry and almond notes

⊕ **cinnamon** brings warmth and sweetness

Sweet and sour

The decidedly tart yet fruity flavor profile of anardana is due to a relatively high acid content balancing out the fruit sugars, while large amounts of tannins provide a mouth-drying finish.

Exact proportions vary depending on the region of cultivation; seeds from North India are known for their sourness.



Anardana = *23% sugar content* + *11% acid content* + *5% tannin content*

FOOD PARTNERS

⊕ **Tropical fruit** Sprinkle ground anardana over a mango and lime salad.

⊕ **Vegetables** Add dried seeds to braised vegetables; sprinkle whole or ground over curried carrot or parsnip soup, or potato and cauliflower curry.

⊕ **Meatballs** Make *ash-e anar*, an Iranian soup containing meatballs, pomegranate (fresh and dried), yellow split peas, rice, and herbs.

⊕ **Chicken** Add dried seeds to a spiced yogurt marinade for chicken before grilling or barbecuing.

⊕ **Rice, chickpeas** Pair with dried fruits in a fragrant pilaf, or scatter over fried cooked chickpeas along with cumin and salt.

⊕ **Sweet baked goods** Stir dried seeds into a mix for granola bars or cookie dough.

RELEASE THE FLAVOR

Anardana's main flavor profile comes from sugars, acids, and tannins, all of which dissolve in water.

Add directly to a watery sauce (no need for oil) to infuse a dish with the spice's pleasant tang.

Pound dried seeds for a more intense flavor, but use a pestle and mortar as the seeds will stick to a grinder.

SUMAC

Sour | Fruity | Woody

BOTANICAL NAME
Rhus coriaria

ALSO KNOWN AS
Elm-leaved sumac

MAJOR FLAVOR COMPOUND
Malic acid

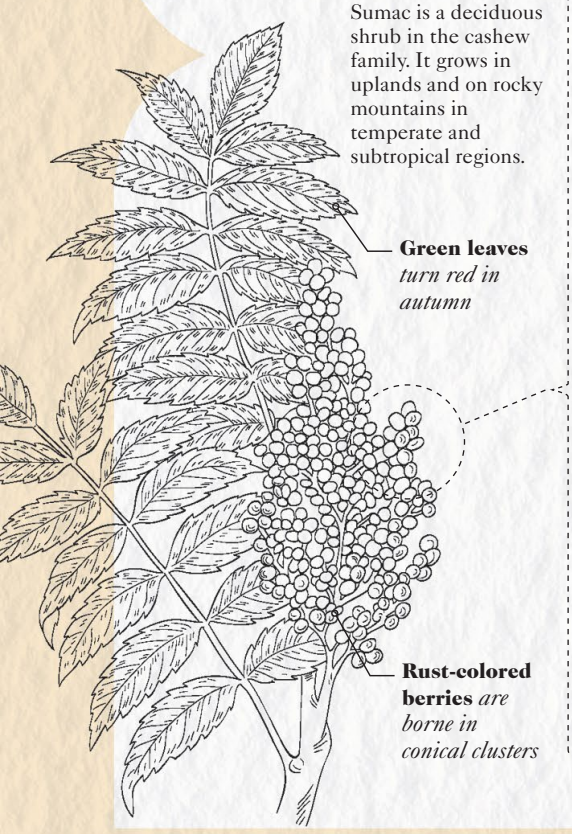
PARTS USED
Dried berries (in fact drupes, not true berries)

METHOD OF CULTIVATION
In late summer, just before the fruits fully ripen, the branches are dried in the sun. The berries are then rubbed off.

COMMERCIAL PREPARATION
Berries are cleaned and may be brined for several days before grinding. Further drying may be needed after grinding.

NON-CULINARY USES
Fabric dye; leather tanning; in traditional Middle Eastern medicine to treat fever.

The plant
Sumac is a deciduous shrub in the cashew family. It grows in uplands and on rocky mountains in temperate and subtropical regions.



Coarse powder *is brick-red and slightly moist*

Powder
Sumac is not highly scented, so lack of aroma need not be a sign of poor quality. Salt might be mixed in to prevent clumping; avoid buying sumac with this additive. Whole dried berries may also be available.

Spice story

The name "sumac" is derived from the Aramaic word *summaq*, meaning "red." Long before lemons reached Europe, the Romans imported sumac from Syria to use as a souring agent, and also as a dye. The Roman naturalist Pliny the Elder celebrated its astringent and cooling properties. Sumac has been used in Middle Eastern cooking since at least the 13th century CE in the *za'atar* spice blend, alongside sesame seeds and dried herbs. The spice is mainly used in Lebanese, Syrian, Turkish, and Iranian cuisine. Until the 1980s, sumac was almost impossible to obtain outside of the Middle East. However, a number of food writers have championed Middle Eastern cuisine in the last couple of decades, and as a result this spice is now experiencing a renaissance among cooks in the West.

Region of cultivation
Sumac grows wild and is cultivated across the Mediterranean and the Middle East, particularly in Sicily, Turkey, and Iran, and in some parts of Central Asia.

Kitchen creativity

Sumac has a sharp, acidic taste, reminiscent of lemon balm, and a spicy, earthy, woody aroma. It can be used in any dish that calls for lemon zest or lemon juice, or as a seasoning added like salt.

BLENDING SCIENCE

Sumac owes its sharp, mouth-puckering tartness to high levels of organic acids (mainly citric, tartaric, and malic acids) and astringent tannins. Fragrance comes from the terpenes caryophyllene, which has a musty, woody aroma, and pinene, which carries a fresh, pinelike aroma. "Green" aldehydes, such as earthy decenal and fruity, floral nonanal, complement the freshness.

SUMAC
Su

TANNINS AND ORGANIC ACIDS
sharp / astringent / acidic

combine with sweet or citrus spices to balance the sour acids:

⊕ **coriander** contributes harmonizing lemon and shared floral notes, and adds eucalyptus

⊕ **nutmeg** used sparingly brings warm, earthy spiciness

⊕ **cinnamon** and **cassia** bring warming sweetness and accentuate floral notes; cassia also adds bitterness

⊕ **anise** balances with sweet licorice and adds nuances of cherry, creamy vanilla, and cocoa

⊕ **allspice** adds sweet peppery warmth

DECENAL AND NONANAL
green / fruity / floral

pair with spices that complement the "green," fruity, floral flavors:

⊕ **cardamom** brings strong eucalyptus notes and is a great match, thanks to its floral and green, herby profile; limonene adds aromatic depth to sumac's citrus sourness

⊕ **vanilla** adds rich, mellow creaminess and subtle cherry notes

PINENE
woody / spicy / camphorous

combine with other spices containing pinene for a complementary flavor profile:

⊕ **juniper** is a very good match, bringing strong pine aromas, slight sweetness, and a gentle bitterness to contrast with sumac's acidic sourness

CARYOPHYLLENE
woody / spicy / warming

pair with spices that enhance the woody, spicy warmth:

⊕ **cumin**, when roasted, produces flavor compounds that closely parallel caryophyllene, shares pinene, and brings roasted, nutty pyrazines

⊕ **fresh ginger**'s sweet lemony flavors complement sumac's citrus sourness, while developing a subtle underlying spiciness

FOOD PARTNERS

⊕ **Root vegetables** Sprinkle ground sumac over roasted root vegetables.

⊕ **Tomatoes** Garnish sliced ripe tomatoes with sumac and a drizzle of pomegranate molasses.

⊕ **Chickpeas** Sprinkle over hummus or fried chickpeas, or use in falafel.

⊕ **Meat** Use sumac to garnish grilled or roast chicken or quail, with oil as a marinade for meat, or in lamb kofte.

⊕ **Fish** Sprinkle sumac over Lebanese-style spicy baked fish.

⊕ **Yogurt and cheeses** Scatter sumac over a whipped feta and tahini dip, baked feta, or fresh labneh with herbs, or over grilled halloumi.

RELEASE THE FLAVOR

Much like salt, sumac enhances the flavors of foods to which it is added. Use powder to experience the full intensity of sumac's dry tartness and aroma.

The strained juice has a milder flavor that works well in jellies and sweet, summery drinks.

Sprinkle sumac as a garnish over a finished dish for maximum impact, rather than at the start of cooking.

BLEND TO TRY

Use and adapt this recipe for a classic Syrian seasoning:

Za'atar p.22

TAMARIND

Sour | Fruity | Sweet

BOTANICAL NAME
Tamarindus indica

ALSO KNOWN AS
Indian date

MAJOR FLAVOUR COMPOUNDS
Furfural, 2-phenyl acetaldehyde

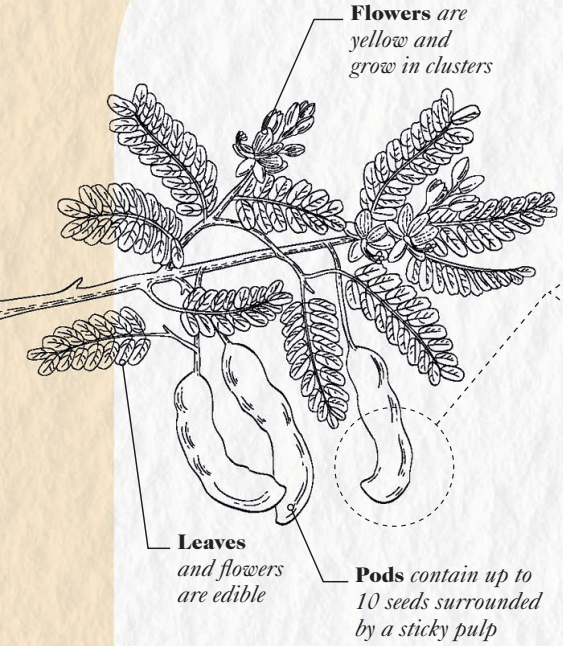
PARTS USED
Pulp of ripe pods

METHOD OF CULTIVATION
Pods are harvested when fully ripe, and are either picked by hand, or fall to the ground when the tree is shaken.

COMMERCIAL PREPARATION
Pod shells are removed and the pulp is compressed into blocks of paste.

NON-CULINARY USES
In traditional medicine to treat bowel disorders, jaundice, and nausea. All parts have laxative and antiseptic properties.

The plant
The tamarind tree is a large tropical evergreen tree in the bean family. It can grow to a height of 98 ft (30 m).



Block
The semi-dried fibrous mass of pulp is soaked in hot water, then mashed to a paste and passed through a sieve.

Paste
Prepared pastes are available for convenience. To use, thin the paste by mixing with warm water.

Spice story

Tamarind is a well-traveled spice: it has been used and traded widely for thousands of years. The Ancient Greek botanist Theophrastus described the plant in his writings on herbal medicine. Its English name comes from the Arabic "*tamr hindi*," meaning "date of India," because it reminded Arab sea traders of their native date palm; however, tamarind is in the pea family, and is native to East Africa. It probably arrived in India more than 2,000 years ago, and became established throughout the subcontinent both as an essential cooking spice and as a medicine. Traders brought it to Europe during the Middle Ages, by which time India had become the main supplier. During the 17th century, Spanish explorers carried it to the New World, including the West Indies, where it became important both in cooking and as an ornamental plant.

Region of cultivation
Tamarind is native to eastern Africa, possibly Madagascar. It is cultivated in most tropical regions, with India, Thailand, and Sri Lanka being among the main producers.

Kitchen creativity

In Africa, Asia, the Middle East, and India, tamarind plays an essential role in chutneys, sauces, curries, soups, and drinks. Its fruity-sour taste helps to temper fiery dishes. It is often used as a fruitier-tasting alternative to lemon juice.

BLENDING SCIENCE

The principal flavor compounds of tamarind are the fruity aldehydes furfural and phenyl acetaldehyde. Having scant supply of oil, there are relatively small amounts of rapidly evaporating flavor molecules, so tamarind has only a mild aroma, but citrusy limonene is present in sufficient amounts for its fragrance to be detected.

TAMARIND
Ta

TARTARIC ACID AND SUGARS
sour / sweet / acidic

2-PHENYL ACETALDEHYDE
chocolate / cocoa / honey

FURFURAL
sweet / bready / almond

LIMONENE
citrus / herby / turpentine

pair sharp with sweet for spice harmony:

⊕ **cinnamon** contains sweet cinnamaldehyde, which complements tamarind's high sugar content

⊕ **licorice**'s intensely sweet glycyrrhizin makes a perfect sweet-sour match

bring out luscious aromas with similar compounds:

⊕ **vanilla** is a good match with its honeyed flavor compounds and heady mix of sweet aromas

pair with another furfural:

⊕ **sesame**'s shared furfural makes it an unusual but effective partner, balancing richness with tamarind's sour fruitiness

accentuate aromas with other citrusy compounds:

⊕ **ginger** shares limonene and adds flowery notes, especially when fresh

⊕ **lime** shares limonene and adds a green citrus tang

⊕ **black pepper** carries limonene, making it an excellent partner in spicy blends

Don't ditch the seeds!

Tough tamarind seeds can, in fact, be made palatable, and need not be discarded after extracting the "juice" from a block. They have a pleasant peanutlike taste.

Remove traces of pulp and roast in a dry frying pan.

Soak the seeds in water and peel off the protective coat.

Boil the seed kernels, or fry them in oil.

FOOD PARTNERS

⊕ **Vegetables** Drizzle a little tamarind juice into a yogurt dip for cauliflower or onion pakoras.

⊕ **Fish** Combine with raw sugar and chilis for a dipping sauce with fish.

⊕ **Pork and lamb** Mix paste or juice with soy sauce and ginger as a marinade for pork or lamb.

⊕ **Bulgur wheat** Make a dressing with liquid or diluted paste, pomegranate molasses, olive oil, and Middle Eastern herbs and spices, then drizzle over a bulgur wheat salad.

⊕ **Drinks** Make your own "tamarind-ade," combining strained liquid with sparkling water or soda, adding sugar to taste, and serving over ice.

RELEASE THE FLAVOR

Derived from fruit pulp, the distinctive chemical components of tamarind make it an effective flavoring for water-based dishes, and give it a long shelf life.

The principal flavor compounds of tamarind readily dissolve in water—unusual among spices—so there is no need to fry in oil to release the flavors.

Acids and sugars *comprise 50 per cent of pulp mass*

High acid and sugar content prevents the growth of bacteria, so a block can be stored for a year or more.

DATE AND TAMARIND GRANITA WITH CARAMELIZED PINEAPPLE

In this innovative ice, warming notes of cumin and garam masala contrast with astringent tamarind, zesty ginger, and the herbal pungency of fresh green chilis. It is a combination inspired by South Asian street food, in which these spices work together as thirst quenchers in the intense heat of high summer.

SPICE IDEAS

Replace amchoor with ground anardana in the chaat masala to **bring a slightly bitter tang** to the fruity sourness.

Fans of licorice flavors could **add two whole star anise** and a teaspoon of toasted fennel seeds to the date palm syrup.

Strengthen the ginger by replacing fresh root with a teaspoon of ground; the nutty warmth of cumin will soften any rough aftertaste.

Serves 6 as an appetizer

Prep time 2 hours

Cooking time 30–35 mins

For the granita

¾ tsp cumin seeds

½ cup (125 g) jaggery or palm sugar, chopped

¼ cup (50 g) liquid glucose

3 cups (750 ml) water

1 large lime

⅓ cup (75 g) fresh root ginger, peeled and roughly chopped

⅔ cup (150 g) seedless tamarind block, broken into pieces

½ cup (100 g) pitted dates, roughly chopped

2–3 green chilis, chopped, with seeds

large bunch fresh mint

½ tsp garam masala (see recipe p.40)

½ tsp black salt

For the caramelized pineapple

4 tbsp powdered sugar

2 tsp *chaat masala* (see recipe p.42)

1 tsp Kashmiri chili powder or hot paprika

10 oz (300 g) fresh pineapple, peeled, cored, and diced

1 To make the granita, heat a small, heavy-based frying pan over medium heat and toast the cumin seeds for about 1 minute, until fragrant. Cool, then pound to a powder using a pestle and mortar.

2 Put the jaggery or palm sugar, liquid glucose, and water in a saucepan and cook over moderate heat, stirring occasionally, until the sugar has dissolved. Simmer for 3–4 minutes.

3 Remove the rind from the lime with a vegetable peeler, taking care not to include any bitter white pith. Add the lime rind, chopped ginger, tamarind, dates, and chilis to the pan. Simmer, uncovered, over medium–low heat for 20 minutes, until softened. Remove the pan from the heat.

4 Reserve a few small mint leaves for a garnish, then roughly chop the remaining leaves and stalks and add to the pan. Cover and leave to infuse for 30 minutes.

5 Push the pulp through a sieve set over a bowl, discarding anything left in the sieve. Whisk the garam masala, black salt, and ground cumin into the syrup in the bowl. Taste for sweetness and add more sugar if it is too sharp; aim for a balance of sweet and sour flavors.

6 Transfer the syrup to a freezerproof container. Leave to cool completely, and then place in the freezer for at least 1 hour, until ice crystals form and it has set.

7 Now make the caramelized pineapple. Sift the powdered sugar into a bowl with the *chaat masala* and chili powder. Add the diced pineapple and stir to coat with the spice mix.

8 Heat a large, dry frying pan. Shake off any excess spice mix from the pineapple pieces and add the fruit to the pan. Cook over medium heat, stirring frequently, for 5–8 minutes, until the pineapple caramelizes. Transfer the fruit to baking parchment and leave to cool.

9 Remove the granita from the freezer and rake it roughly with a fork. Spoon into small glasses and sprinkle each glass with the caramelized pineapple and mint leaves.

CAROB

Sweet | Astringent | Chocolatey

BOTANICAL NAME
Ceratonia siliqua

ALSO KNOWN AS
St. John's bread, locust bean, locust seed

MAJOR FLAVOR COMPOUNDS
Pentanoic, hexanoic, and pyruvic acids

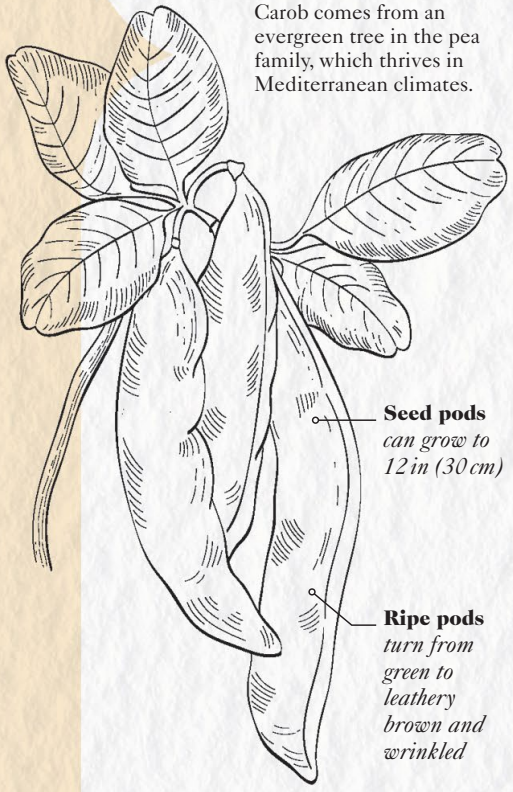
PARTS USED
Dried ripened pods (technically fruits)

METHOD OF CULTIVATION
Trees grow in orchards and ripe pods are harvested by hand or by shaking them onto nets.

COMMERCIAL PREPARATION
Pods are partially dried and either left whole or crushed to remove the seeds.

NON-CULINARY USES
Animal feed; cigarette flavoring; seeds are used to make a gelling agent (locust bean gum) employed in food and cosmetics.

The plant
Carob comes from an evergreen tree in the pea family, which thrives in Mediterranean climates.



Powder
Carob powder is usually made with roasted pod and pulp, but is also available raw. The powder will keep almost indefinitely in a sealed container in a cool, dark place.

Whole
Dried pods can be roasted and/or eaten whole, avoiding the rock-hard seeds; or use to make a syrupy liquid by boiling in water or milk. Broken pieces are also available as "kibble."

Spice story

The fruit of the carob tree has nourished humans and animals since ancient times. The tree's ability to fruit in poor-quality soil made it important when famine struck, and the Bible mentions its use as livestock fodder. The common names St. John's bread and locust bean derive from the "locusts" that St. John the Baptist was said to have eaten in the desert, which scholars believed were in fact carob pods (though most now think he was eating grasshoppers). The word "carat" originates from the Greek for the carob tree, *keration*: Arab jewelers used the seeds as a unit of weight for gold. The pods were easy to transport, and the Greeks and Arabs took carob west with them. Arabs brought it north to Spain and Portugal, where it was cultivated from the 17th century, and from there it spread to the New World.

Region of cultivation
Carob is probably native to the eastern Mediterranean and the Levant. It is now cultivated mainly in Spain, but also in Italy (especially Sicily), Portugal, Morocco, Greece, Cyprus, Turkey, and Algeria.

Kitchen creativity

Sweet and slightly acidic tasting, carob has a rich, warm, almost vanilla-like flavor that vaguely resembles milk chocolate, but it lacks cacao's bitterness, and has an unusual, slightly sour aroma. This spice is a rich source of sugar.

BLENDING SCIENCE

Pentanoic and hexanoic acids dominate, giving sour milk flavor and "sweaty cheese" aroma, respectively, while pyruvic acid has a brown sugar nuance. Sweet, fruity ketones are also present, including pineapple ketone, as well as warming, spicy cinnamaldehyde, and a terpene called farnesene, which has woody and sweet citrus notes. When roasted, pyrazines give chocolatey, nutty aromas, but cinnamaldehyde is degraded.

CAROB
Cb

PINEAPPLE KETONE, PYRUVIC ACID
sweet / fruity / brown sugar / caramel

PENTANOIC ACID, HEXANOIC ACID
sour milk / sweaty cheese

CINNAMALDEHYDE
warm / sweet / fragrant

PYRAZINES, FARNESENE
nutty / roasted / bready / woody

combine with sweet spices that enhance the background of sugary fruit:

- ⊕ **fenugreek** shares brown sugar flavor, with a hint of maple syrup, while bringing savory tastes reminiscent of clove
- ⊕ **fennel** seeds carry sweetness and a licorice-like aroma, bringing floral and citrus elements
- ⊕ **cardamom** brings eucalyptus and is a surprisingly good match thanks to its sweet minty notes
- ⊕ **licorice** is intensely sweet with potent aniseed notes

pair with acidic or sour spices to bring tangy tartness:

- ⊕ **tamarind** is strongly sour with underlying honey-caramel
- ⊕ **sumac** is tangy and earthy with plum nuances
- ⊕ **barberry** is fresh, green, invigoratingly sour and subtly floral
- ⊕ **amchoor** brings tropical fruit flavors and astringency

found in unroasted carob, highlight it with cinnamon flavor:

- ⊕ **cinnamon** lends sweet, fragrant, spicy, and warming qualities
- ⊕ **cassia** is similarly sweet and warming, but its bitterness is harsher and it has some astringency

pair with nutty, woody spices that enhance the deep, roasted flavors:

- ⊕ **roasted sesame** brings harmonizing nutty flavors
- ⊕ **cacao** has close harmony due to its backbone of roasted flavor compounds
- ⊕ **wattle** adds strong smoky overtones with earthiness
- ⊕ **grains of Selim** shares farnesene and carries sweet vanilla notes; its penetrating smokiness blends with roasted carob
- ⊕ **nutmeg** is sweetly aromatic and has woodiness, thanks in part to farnesene

FOOD PARTNERS

- ⊕ **Vegetables** Drizzle carob syrup over grilled or roasted eggplant.
- ⊕ **Meat** Use carob syrup in a barbecue glaze for chicken or lamb, or mix the powder into a rub or marinade.
- ⊕ **Baking** Add carob powder to coffee cake batter and spiced vanilla cookie dough, or stir into a flapjack mixture (remember it is sweeter than cocoa).
- ⊕ **Desserts** Blend frozen bananas with vanilla extract and a spoonful or two of the powder or syrup to make carob banana ice cream.
- ⊕ **Drinks** Blend carob powder with cold milk and ice to make a refreshing alternative to an iced latte.

RELEASE THE FLAVOR

Whole pods offer most flavor, but should be used according to the nature of the dish. Roasting causes amino acids and sugars to react with each other, creating new nutty, coffee-and-chocolate-like compounds, but reducing sweetness.

For quick-cook dishes, grind pods or soak until soft and mash or blend.

For slow-cook, liquidy dishes whole pods can be added directly.

Roast raw pods for 40 minutes at 300°F (150°C). Reduce the time for kibble and check to prevent burning.

BARBERRY

Sour | Sharp | Tangy

BOTANICAL NAME
Berberis vulgaris

ALSO KNOWN AS
Piperidge, jaundice berry, *zereshk*

MAJOR FLAVOR COMPOUND
Hexanal

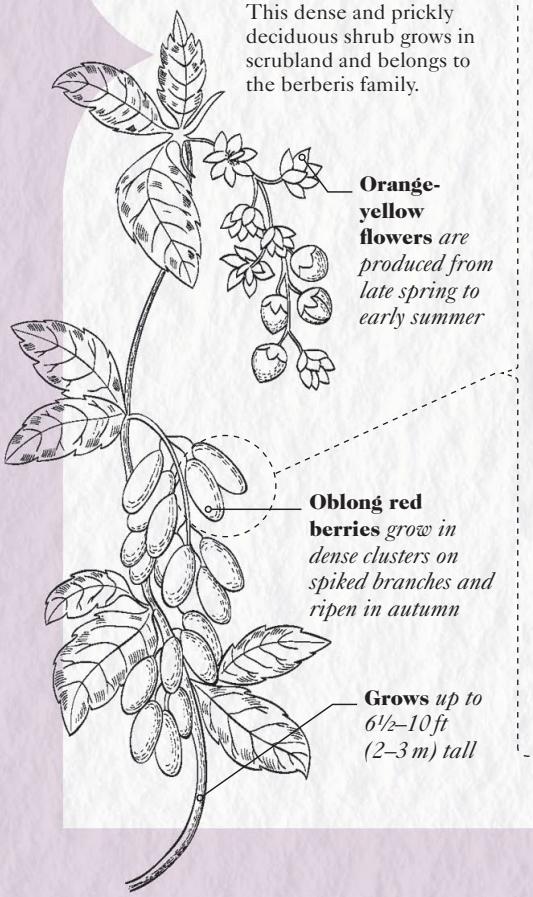
PARTS USED
Dried berries

METHOD OF CULTIVATION
Fruits are harvested manually, most commonly by hitting the branches with a stick until the berries fall off.

COMMERCIAL PREPARATION
Berries are dried in the sun, in the shade, or in industrial driers; research shows that driers yield the best-quality spice.

NON-CULINARY USES
In Iranian traditional medicine to treat jaundice, inflammation, and toothache.

The plant
This dense and prickly deciduous shrub grows in scrubland and belongs to the berberis family.



Orange-yellow flowers *are produced from late spring to early summer*

Oblong red berries *grow in dense clusters on spiked branches and ripen in autumn*

Grows *up to 6½–10 ft (2–3 m) tall*

Use berries *whole or chopped, as they are or soaked first*

Dried berries
Only choose berries that are bright red in color, indicating they have been dried carefully and are not overly old. Store them in a sealed container in the freezer for up to 6 months, and defrost as needed.

Spice story

The earliest record of the use of barberry fruits dates back to 650 BCE, when a description of their blood-purifying properties was inscribed on clay tablets in the library of the Assyrian king Ashurbanipal. The plant's use in Chinese medicine dates back over 3,000 years, and evidence of its medicinal use in Europe has nearly as long a history; for example, the bark from the root and the stem was used as a purgative and tonic. Throughout the Middle Ages, barberry was widely used in preserves, syrups, and wines in western Europe. Later, the herbalist John Gerard (1545–1612) suggested that the berry could be used to season meat—a flavoring idea that has stood the test of time! Barberry was first cultivated in Iran over 200 years ago, and the berries have since become an important part of cooking in the Middle East and the Caucasus.

Region of cultivation
Barberry is native to central and southern Europe, northwest Africa, and western Asia. It is now cultivated mainly in Iran (which produces more than 11,000 tons of barberry fruits every year), but also in northern Europe and North America.

Kitchen creativity

Barberries tolerate being combined with other strong flavors very well, and add zing to all kinds of savory and sweet dishes. Their jewellike appearance also makes them an attractive decoration.

BLENDING SCIENCE

Containing high levels of acids and sugars, dried barberries are a versatile flavoring that straddles the sweet–sour spectrum. The ability of sugars to reduce taste bud sensitivity to bitterness and sourness, alongside a bouquet of flavor compounds, including herby hexanal and floral linalool, offer a wide variety of spice-pairing options.

BARBERRY
Ba

MALIC, TARTARIC, AND CITRIC ACIDS
sharp / sour / lemony

pair with other acid-tasting spices for a potent, sour hit:

- ⊕ **sumac** shares all three acids
- ⊕ **tamarind** shares tartaric acid and like barberry has a sweet and tart profile
- ⊕ **galangal**'s penetrating spiciness works well with the acidity of citric acid
- ⊕ **coriander** brings complex floral and citrus notes through shared linalool

ALDEHYDES (HEXANAL AND NONANAL)
green / grassy / fruity

add more "green" spices to enhance the aldehydes:

- ⊕ **bay** adds fresh and floral notes that complement barberry's hexanal and linalool
- ⊕ **ajwain** lends a "green" quality that blends well with the aldehydes

SUGARS (EG. DEXTROSE, FRUCTOSE)
sweet

enhance the sweetness of other sweetly fragranced spices, and dampen the sourness and bitterness:

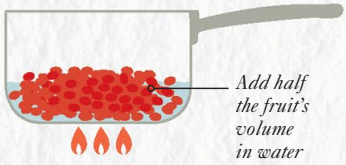
- ⊕ **cacao**'s bitterness can be tempered, and its sweet aromas enhanced
- ⊕ **cinnamon** adds floral notes from shared linalool
- ⊕ **vanilla** brings a creamy quality that helps to balance barberry's sharp acidity
- ⊕ **annatto** is sweetly aromatic with an edge of bitterness from caryophyllene

FOOD PARTNERS

- ⊕ **Salad** Crush the dried berries and sprinkle them over salads.
- ⊕ **Red meats** Crush barberries with salt and use as a rub for lamb, beef, or game.
- ⊕ **Pilaf** Soak the dried berries and then fry them in butter before adding to rice to make a pilaf.
- ⊕ **Preserves** Use fresh berries to make a fruit "leather" by boiling down the fruit, straining it, and spreading it out on a tray to dehydrate.
- ⊕ **Drinks** Add a syrup made with the dried berries to refreshing cool drinks.

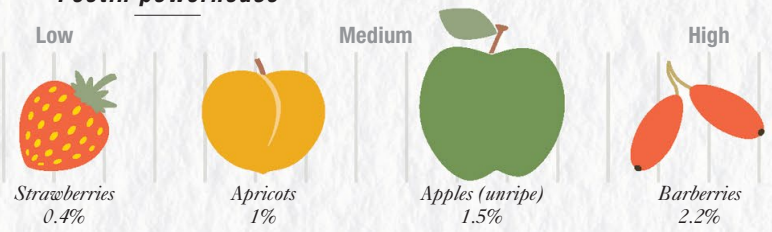
RELEASE THE FLAVOR

Berries can be rehydrated before cooking to dilute their sharpness and speed up the release of flavor compounds. Soak in cold water for 10 minutes or simmer briefly in a little boiling water.



Pectin powerhouse

Pectin is the chemical glue that holds plant cells together, and it is present in all fruits in varying amounts. When fruits are cooked in sugar and water, pectin seeps out and reforms into a gluey gel when cooled—the basis for a jam. Barberries are high in pectin, and their acidity causes it to be quickly released. Flavoring jams and jellies with barberries thus helps to achieve a quick, strong set, particularly for medium- to low-pectin fruits.



COMPARATIVE PECTIN LEVELS

CACAO

Earthy | Floral | Bittersweet

BOTANICAL NAME
Theobroma cacao

ALSO KNOWN AS
Cocoa

MAJOR FLAVOR COMPOUND
Isovaleraldehyde

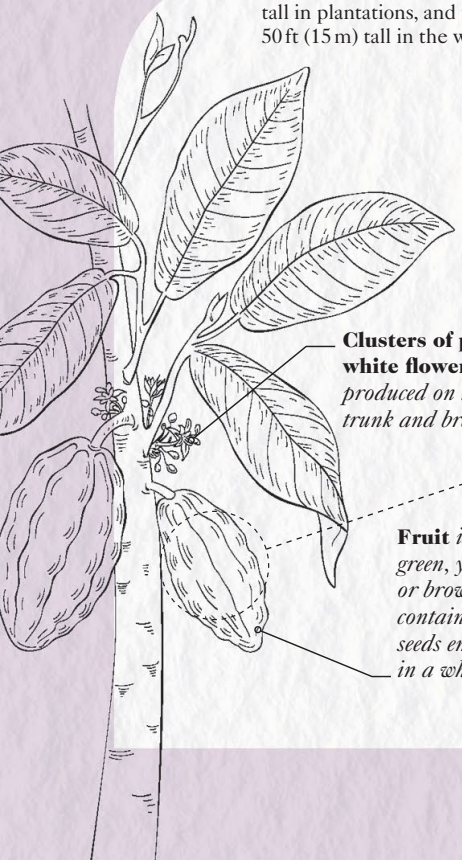
PARTS USED
Seeds (also known as "beans")

METHOD OF CULTIVATION
Ripe fruits are harvested with a special cutting hook mounted on a pole.

COMMERCIAL PREPARATION
The bitter raw seeds are fermented to develop palatable flavors, then dried—often next to open wood fires—roasted, and cracked to release the inner kernel.

NON-CULINARY USES
In traditional medicine as a powerful stimulant; in modern medicine reported to protect against cardiovascular disease.

The plant
Cacao is a broad-leaved, tropical evergreen tree in the mallow family. It grows up to 23 ft (7 m) tall in plantations, and up to 50 ft (15 m) tall in the wild.



Clusters of pinkish-white flowers *are produced on the main trunk and branches*

Fruit *is a green, yellow, or brown pod containing large seeds embedded in a white pulp*

Use nibs *whole, chop roughly, or grind to a coarse powder in a pestle and mortar*

Nibs
Cacao nibs are broken pieces of the unsweetened inner kernel of the cacao seed. They are available pre-roasted or raw (see Release the Flavor).

Spice story

There is evidence that cacao was being used by the Olmec people of southern Mexico as early as 1500 BCE. By 600 BCE, the Olmec had introduced cacao to the Maya of Yucatan, who used it as a source of nourishment. They traded cacao to the Aztecs, who turned the beans into a thick, unsweetened drink. When the Spanish invaded Yucatan in the early 16th century they recognized that cacao was a precious commodity, and began sweetening it with cane sugar. The first recorded shipment of cacao beans to Europe reached Spain in 1585. Within a century, chocolate beverages were being consumed across Europe, long before coffee and tea. The first ever solid chocolate bar was manufactured by Fry's of Bristol in England in 1847.

Region of cultivation
Cacao is native to tropical Central and South America. More than 50 percent of the world's total crop is now produced in the Ivory Coast and Ghana, but many other tropical countries cultivate cacao, including Ecuador, Brazil, Peru, Colombia, Mexico, Dominican Republic, and Indonesia.

Kitchen creativity

One of the most complexly flavored foods, cacao nibs are earthy, bitter, and fragrant, but unlike chocolate they do not melt without grinding to a paste. They have a nutlike crunchy texture and can be used whole, chopped, or ground to a coarse powder.

BLENDING SCIENCE

Cacao contains about 600 flavor compounds, and their relative amounts vary by region, tree variety, and processing method. Bitterness is partly produced by two stimulant compounds, caffeine and theobromine, which turn into bitter pyrazines on roasting. Cacao also contains sweet-tasting aldehydes and ketones, as well as fruity alcohols and phenols. Pyrazines also give the spice its roasted, nutty flavors.

PYRAZINES, THEOBROMINE, CAFFEINE
bitter / roasted nut / earthy

KETONES
sweet / honey / floral

ISOVALERALDEHYDE (AND OTHER ALDEHYDES)
chocolatey / fatty / peach

ALCOHOLS, ESTERS
fruity / herby / flowery

pair with woody spices that enhance the roasted, nutty flavors:

- ⊕ **wattle** adds roasted-coffeelike taste with powerful smoke aroma
- ⊕ **black pepper** lends a woody, slightly bitter, warm pungency
- ⊕ **sesame** brings harmonizing nutty flavors after roasting
- ⊕ **cumin** adds an earthy, smoky woodiness and introduces an aroma of pinewood

pair with sweet spices to enhance chocolate flavors:

- ⊕ **vanilla** is sweet, unmistakably creamy rich and aromatic
- ⊕ **mahleb** contributes bittersweet cherry and almond aroma
- ⊕ **mace** brings sweet musky and orangey flavors (less so with nutmeg)

pair with spices that stand up to bitterness while enhancing fruity and floral notes:

- ⊕ **coriander** amplifies floral and enhances fruit with lemon notes
- ⊕ **chilli** brings fruity and green nuances, adding a mouth-warming dimension
- ⊕ **bay** brings a penetrating, fresh, slightly floral herbiness
- ⊕ **ginger** brings pungent warmth, sweet citrus, and floral linalool

pair with spices that bolster the sweet honey aroma of cacao:

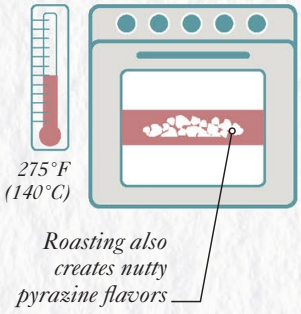
- ⊕ **licorice** carries an intense sweetness, bringing clove taste and strong eucalyptus
- ⊕ **cinnamon** contributes sweet warming qualities
- ⊕ **allspice** provides a sweet peppery warmth
- ⊕ **sweet paprika** enhances sweetness, introducing earthiness

FOOD PARTNERS

- ⊕ **Fennel, pumpkin** Sprinkle nibs over a fennel and blood orange salad, or grate over pumpkin and sage ravioli.
- ⊕ **Squid** Add roughly ground nibs to a tempura batter for squid.
- ⊕ **Meat** Rub ground toasted nibs onto steak before grilling; add to Italian *agrodolce* sauce for duck or pork; mix into a fruity, spicy lamb tagine.
- ⊕ **Sweet baked goods** Add nibs to banana bread, pancakes, or cookies.
- ⊕ **Cheesecake** Add nibs to the cookie base ingredients for a savory or sweet cheesecake.

RELEASE THE FLAVOR

Unroasted ("raw") cacao nibs are not sweet and much more bitter than chocolate. Roasting them before use helps to remove some of the bitterness.



Roast nibs in an oven at 275°F (140°C) for 10–15 minutes.

BLEND TO TRY

Use and adapt this classic blend featuring cacao:

Mole mix p.65

PAPRIKA

Bittersweet | Earthy | Fruity

BOTANICAL NAME
Capsicum annuum

ALSO KNOWN AS
Hungarian pepper, *pimentón*

MAJOR FLAVOR COMPOUNDS
Pyrazine combinations

PARTS USED
Fruits

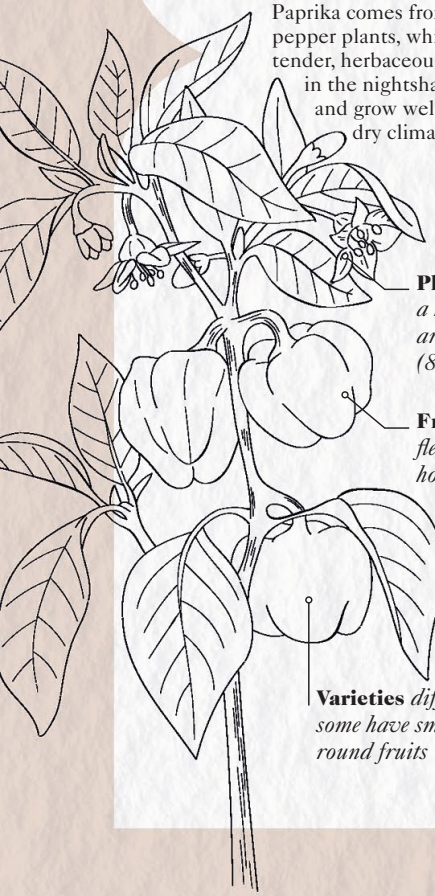
METHOD OF CULTIVATION
Fruits of chili peppers are harvested in summer when they are red and ripe.

COMMERCIAL PREPARATION
Fruits are dried then ground. Peppers for smoked paprika are hung in smokehouses before processing.

NON-CULINARY USES
In cosmetics and pharmaceuticals for its pigment and the inflammation-reducing properties of capsaicin.

The plant

Paprika comes from chili pepper plants, which are frost tender, herbaceous perennials in the nightshade family, and grow well in warm, dry climates.



Plants *reach a height of around 2½ft (80cm)*

Fruits *are fleshy and hollow*

Varieties *differ; some have small, round fruits*

◀ *Hungarian*

Grades *range from erós, the spiciest, to különleges, the mildest*

Three main varieties *are picante (hot), dulce (sweet), and agridulce (bittersweet)*

Spanish ▶

Powder

There are two main types of paprika: Hungarian, which is bright- or rust-red and with pronounced fruitiness; and Spanish—known as *pimentón*—which is darker and sweeter. Both are available smoked.

Spice story

Capsicum peppers probably originated in Mexico, where recent cave findings suggest they were being eaten as far back as 7000 BCE. In the late 15th century CE, explorer Christopher Columbus shipped peppers back to Europe from the Caribbean. Spanish monks started drying and grinding the fruits, and one of the world's best smoked paprikas is still made in La Vera valley in Extremadura, where ripe peppers are hung in smokehouses in the fields and ground in ancient stone mills. The Ottoman Turks introduced peppers to Hungary and by the mid-1800s Hungarians had adopted paprika as their national spice and made it a key ingredient of goulash, a rustic meat soup. French chef Georges Escoffier is credited with introducing paprika to the wider culinary world: he had it shipped from Hungary to his Monte Carlo restaurant in 1879 and put *poulet au paprika* on the menu.

Region of cultivation

Peppers are native to South and Central America, but peppers for paprika are grown and processed chiefly in Hungary, Spain, the Netherlands, and Turkey.

Kitchen creativity

The various varieties of paprika are appreciated for their earthy and smoky flavors, spicy heat, and the sweet taste of the fruit's sugars. Choose very mild paprika to harness the rust-red pigment without changing the flavor of a dish.

BLENDING SCIENCE

Paprika's tang derives from sour-tasting citric acid, its sweetness from sugars and the rumlike flavor compound ethyl acetate, and its rich earthiness from pyrazines, many of which develop during the drying and/or smoking. From sweet and fruity, to bitter and smoky, the range of different types of paprika gives a wealth of pairing opportunities.

PYRAZINE COMBINATIONS
earthy / smoky

pair with other pyrazines and related compounds:

- ⊕ **wattle**'s pyrazines and other smoke compounds bring notes of wood smoke and chocolate
- ⊕ **black cardamom** has an earthy flavor and smoked aroma
- ⊕ **sesame** brings rich, nutty, caramel flavors when toasted
- ⊕ **ajwain** in toasted form has an herbal earthiness and slight citrus notes

SUGARS, ETHYL ACETATE
sweet / fruity

enhance the sweet side of paprika:

- ⊕ **cinnamon** lifts the sweetness and adds fragrant warmth
- ⊕ **allspice** brings clovelike sweetness and floral nuances
- ⊕ **caraway** has well-matched citrus and bittersweet flavors, alongside subtle aniseed

ISOVALERALDEHYDE, ACETOINE
fatty / buttery

give prominence to the rich flavors:

- ⊕ **cacao** shares a raft of flavor compounds, including pyrazines, ketones, esters, and isovaleraldehyde
- ⊕ **saffron** when combined with milder paprika brings in a distinctive haylike richness while gently enhancing earthiness

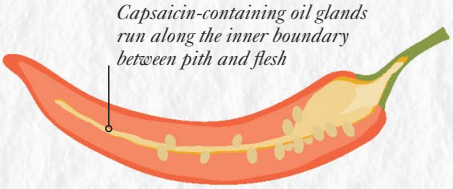
CITRIC ACID
tart / citrusy

boost paprika's tanginess with other acidic or citrus spices:

- ⊕ **tamarind**'s tartaric acid, fruity aldehydes, and limonene bring a sweet-sour hit
- ⊕ **coriander** makes a good match through limonene, its cymene enhancing earthiness
- ⊕ **ginger**'s citrus notes, sweetness, and hot pungent elements can be drawn out by mild, sweet, and hot paprika respectively

Mild or hot?

Chili heat comes from capsaicin molecules, most of which reside in the whitish pith. The degree of heat or mildness in paprika depends on capsaicin levels in the chili variety used and how thoroughly the pith has been removed in processing. Poor quality hot paprika is often made from whole dried fruits, including stems, pith, and bitter seeds.



FOOD PARTNERS

⊕ **Plums** Add smoked paprika to a sweet-sour plum sauce.

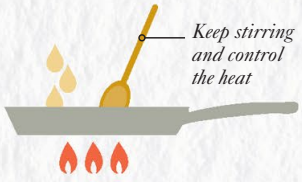
⊕ **Roasted roots** Serve roasted Jerusalem artichokes with a smoked paprika *aïoli*, or salt-baked new potatoes with a *mojo picón* sauce, which includes paprika, cumin, chilis, and garlic.

⊕ **Squid, octopus** Sprinkle hot paprika into the batter for fried squid or add to a Moroccan *chermoula* (herby marinade) for grilled octopus.

⊕ **Meat** Sprinkle smoked paprika and chopped herbs onto roasted marrow bones; add to pork or duck rillettes; rub into beef brisket before slow-cooking; make an offal *paprikash*.

RELEASE THE FLAVOR

Paprika is high in carotenoids (similar to carrots' orange pigment), which, along with its most fragrant flavor compounds, dissolve well in oil. Hence frying with oil at the start of cooking helps spread color and flavor through a dish.



The powder's small particle size means it burns easily. Smoked varieties are already slightly bitter and prone to develop acrid bitterness from scorching.

BLENDS TO TRY

Use and adapt these classic recipes:

Jamaican jerk rub p.68
Chimichurri p.70
BBQ rub p.72

WATTLE

Roasted | Woody | Musty

BOTANICAL NAME
Acacia victoriae
(most commonly used species)

ALSO KNOWN AS
Gundablue wattle

MAJOR FLAVOR COMPOUNDS
Pyrazine compounds

PARTS USED
Seeds

METHOD OF CULTIVATION
Ripe pods are dislodged using a mechanical tree shaker or beating by hand with a stick.

COMMERCIAL PREPARATION
Seeds are separated from pods by threshing and sieving, then dried and roasted.

NON-CULINARY USES
Has been used as animal feed; fruits, seeds, and gum from wattle trees used in traditional Aboriginal medicine for many ailments.

The plant
Edible wattle seeds are produced by a small number of evergreen shrubs or small trees in the bean family.

Cream-colored flowers *are edible and sometimes used as a culinary decoration*

Green pealike pods *turn brown or yellow and become papery and brittle as they ripen*

Wattle *is both flavorful and high in protein (about 20 percent)*

Powder
This robust spice is usually bought ground as a coarse, dark brown powder that resembles ground coffee. It can be stored in a sealed container in a cool, dark place for up to two years.

Spice story

Wattle has been used as a staple food by the aborigines of Australia for at least 4,000 years. Only a few of the hundreds of acacia species that grow in Australia have edible seeds, and some others are toxic. Over a period of thousands of years, the indigenous population identified the edible species. They either ate the seeds fresh, straight from the pod, or dried and roasted or baked them, crushing them between grinding stones to produce flour. Increasing commercial interest in the seeds has led to the development of small-scale plantations in Australia, although a significant proportion of the crop is still harvested from wild trees. As "bush food" increasingly features on Antipodean restaurant menus, wattle's importance as a culinary spice has grown.

Region of cultivation
Acacia victoriae and other edible species of wattle are native to arid and semi-arid regions of Australia. They are cultivated in South and Western Australia, Victoria, and New South Wales.

Kitchen creativity

Wattle has a unique nutty, roasted coffeelike taste with a lightly charred woody and smoky aroma, plus notes of popcorn and sweet citrus. The complex flavors of this spice work well with both sweet and savory recipes.

BLENDING SCIENCE

The flavor profile of wattle is dominated by a water-soluble pyrazine with a bitter, musty, earthy, roasted-coffee flavor with hints of cocoa, and an oil-soluble pyrazine with a sweet, nutty, charred wood taste with hints of popcorn. Some intensely lemon-flavored citral and bitter-tasting phenols are also present.

WATTLE
Wa

WATER-SOLUBLE PYRAZINE
bitter / earthy / coffee

CITRAL
citrus / fresh / lemon peel

OIL-SOLUBLE PYRAZINES AND PHENOLS
roasted / charred wood / sweet citrus

pair with spices that enhance the roasted, earthy, bitter flavors:

- ⊕ **sumac** lends a sharp, sweet acid tang
- ⊕ **tamarind** contributes caramel notes and cheeselike aroma
- ⊕ **juniper** adds herbal pine notes and citrus spiciness
- ⊕ **carob** enhances the coffee and cocoa notes, particularly when roasted

pair with spices that complement the sweet woody aromas:

- ⊕ **cinnamon** enhances sweet woody warmth, without bitterness
- ⊕ **paprika** contributes a sweet, woody pungency and smokiness
- ⊕ **cacao** adds bitter chocolate notes
- ⊕ **cumin** has a musky, earthy, almost burnt flavor

foreground the lemony component:

- ⊕ **lemon myrtle** brings a eucalyptuslike aftertaste
- ⊕ **lemongrass** adds mild floral pepperiness and slight spiciness
- ⊕ **dill** gives herbal, minty notes and mild woodiness
- ⊕ **caraway** lends aniselike, spicy notes

RELEASE THE FLAVOR

Wattle does not need to be fried or toasted as the nutty, roasted flavors have already been released during processing. The flavor depends instead on the balance of water and fats within a dish.

Cooking in fats decreases the levels of bitter phenols, and releases lemony citral and the nutty, oil-soluble pyrazines.

Cooking in water-based liquids releases the water-soluble pyrazine and some of the bitter-tasting phenols, resulting in bitter, earthy, roasted-coffee flavors with hints of cocoa.

Stovetop espresso

Maximize water-based flavors while reducing bitterness by using ground wattle like coffee in an espresso machine and cooking with the liquid extract.

FOOD PARTNERS

⊕ **Potatoes** Sprinkle wattle over roasted sweet potato chips or potato wedges.

⊕ **Custard** Infuse custard with wattle, and then turn it into ice cream or serve it warm over sweet sponge pudding.

⊕ **Meat** Add wattle to a dry spice rub or marinade for chicken, lamb, or beef.

⊕ **Breads** Add a sprinkle of wattle to give a nutty sweetness to bread doughs and sweet yeast breads.

⊕ **Tuna** Include wattle in a spice crust for tuna before pan searing.

⊕ **Chocolate** Wattle works well in anything chocolatey—try adding it to chocolate mousse or a chocolate ganache.

SESAME

Nutty | Bittersweet | Rich

BOTANICAL NAME
Sesamum indicum

ALSO KNOWN AS
Benne, sesamum, gingelly, sim-sim

MAJOR FLAVOR COMPOUNDS
Pyrazine combinations

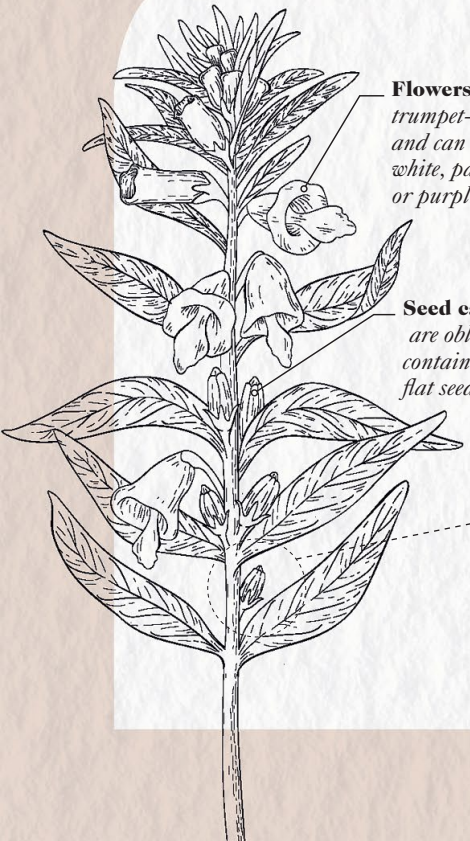
PARTS USED
Seeds

METHOD OF CULTIVATION
Whole plants are cut just before the seed capsules (technically fruits) are fully ripe.

COMMERCIAL PREPARATION
Stalks are dried, threshed, capsules split open, and the seeds shaken out.

NON-CULINARY USES
Sesame oil is used as a base in cosmetics and perfumery. The mildly laxative seeds are used in traditional Asian medicine to treat indigestion and arthritis.

The plant
Sesame is a tropical, annual plant in the pedalium family. It grows to a height of 3–6ft (1–2m).



White
These are sold hulled or unhulled, and toasted or untoasted. Raw seeds have almost no aroma; roasting brings out their nutty taste.

Black
This type of unhulled seed is popular in Chinese and Japanese cookery, and sold toasted or untoasted.

Spice story

Sesame was first cultivated more than 4,000 years ago and was prized by many ancient civilizations. The Babylonians and Assyrians used sesame both in cooking and in religious rituals—in Assyrian mythology, the gods drank sesame wine the night before they created the world. Ancient Egyptians used the oil as a medicine, and ground the seeds for flour. Seed remains were found in Tutankhamun's tomb. In Rome, soldiers carried the energy-giving seeds as emergency rations, and cooks ground them into a pastelike condiment flavored with cumin. In the famous Arabian folk tale, when Ali Baba cries "Open, sesame!" a cave is unsealed to reveal a stash of jewels. This probably alludes to the way ripe seed pods burst open at the slightest touch, scattering their seeds. Sesame traveled to North America and Mexico with the slave trade, and was being grown in colonial America by 1730.

Region of cultivation
Sesame plants originated in sub-Saharan Africa. Sesame is cultivated in China, India, North Africa, North America, Central and South America, and Sudan.

Kitchen creativity

Sesame is used in everything from sweets such as Indian *til laddoos* and Middle Eastern *halva* to savory dips and dressings such as tahini and hummus. The Japanese sprinkle *gomashio*, a sesame-and-salt condiment, over rice and noodles.

BLENDING SCIENCE

Untoasted sesame seeds carry very subtle flavors from compounds such as furfural and hexanal. When roasted or toasted, proteins and sugars on the outer layers of the seed react with one another to form hundreds of new compounds, including nutty, flavorful pyrazines.

PYRAZINES AND 2-FURYL-METHANTHIOL
nutty / coffee / roasted meat

FURFURAL
sweet / bready / caramel

HEXANAL
green / grassy / leafy

emphasize the nutty flavors of toasted seeds:

⊕ **paprika** adds sweet earthiness

⊕ **wattle**'s pyrazines overlap with toasted sesame seed, bringing in notes of wood smoke and chocolate

pair with more furfural spices to intensify baked bread flavor:

⊕ **tamarind** brings caramel-like furfural flavor

⊕ **vanilla**'s complex mix of compounds adds depth to sweet flavors

complement the green aromas:

⊕ **poppy** seeds are packed with similar grassy aldehyde compounds

⊕ **bay**'s green, fresh flavor is heightened by shared hexanal

Black or white?

Darker seeds carry heavier, spicier aromas and are better suited for savory recipes. Pale varieties are ideal for mixing with milder spices and for cooking with butter. Unhulled seeds have a faint bitterness, due to oxalates in the external layers, designed to deter pests.

work best for strongly flavored recipes

Higher concentrations of phenolic defence compounds alongside the pigments convey a stronger, slightly bitter flavor.

used to make pastes and added to sweets

Pale sesame seed varieties have slightly less oil and more moisture, giving them gentler flavors of honey, caramelized milk, and vanilla.

FOOD PARTNERS

⊕ **Bananas and apples** Sprinkle toasted seeds over apple or banana fritters.

⊕ **Vegetables** Sprinkle black seeds over a noodle and vegetable salad with a spicy Szechuan dressing, or scatter over roasted kale or asparagus.

⊕ **Oily fish** Coat tuna or salmon in seeds before pan frying.

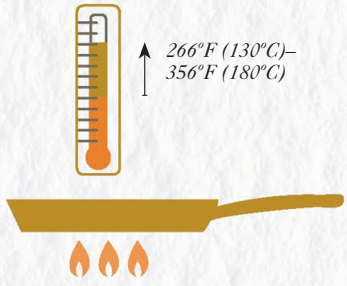
⊕ **Chicken** Coat chicken legs in a ground black sesame, soy, and honey glaze before baking or grilling.

⊕ **Pulses** Roll falafel in raw seeds before cooking.

⊕ **Baking and sweets** Sprinkle raw seeds over bread dough before baking, or make sesame brittle with honey, butter, and white seeds.

RELEASE THE FLAVOR

When sesame seeds are toasted, proteins and sugars on the outer layers react to form new compounds, including roasted-nut pyrazines and the sulfurous, coffee– and roasted meat–like 2-furylmethanethiol.



Proteins and sugars react together at temperatures above 266°F (130°C). Fats inside the seeds burn and produce acrid flavors at around 356°F (180°C), so toast with care.

BLACK SESAME, LICORICE, AND CARDAMOM ICE CREAM

This recipe blends three spices to create a creamy, subtly aromatic ice cream that is flavorful and not too sweet. Its nutty, toasted-sesame taste is enhanced by a hint of licorice and floral cardamom. Adding alcohol makes the ice cream softer straight from the freezer, but you can omit it if you prefer.

SPICE IDEAS

Use white sesame seeds instead of black for less bitterness, and **leave untoasted** to allow honeyed, more floral flavors to gain greater prominence.

Replace a proportion of sesame seeds with **wattle** to bring in notes of chocolate and wood smoke.

Pick up on leafy green hexanal in sesame and eucalyptus-like cineole in cardamom by using **ground bay leaves** in place of licorice.

Serves 4

Prep time 20 mins

Freezing time 20–30 mins in ice-cream maker (remember to pre-freeze the bowl, if applicable); 3–4 hours minimum in freezer

3 heaped tbsp black sesame seeds

¾ cup (300 ml) heavy whipping cream

¾ cup (300 ml) Greek yogurt

¾ cup (300 ml) condensed milk

seeds of 30 cardamom pods, ground

1½ tsp licorice root powder

1½ tbsp white rum or other lightly flavored spirit (optional)

1 Toast the sesame seeds in a dry frying pan over medium heat for about 5 minutes, then leave to cool.

2 Using a spice grinder or small food processor, grind the seeds until they form a powdery paste—this will take about 1 minute.

3 In a large bowl, whip the double cream until it forms soft peaks. Set aside.

4 In another bowl, beat together the yogurt, condensed milk, ground cardamom, licorice powder, and sesame paste. Gently fold this mixture into the cream. Stir in the alcohol, if using.

5 Pour the mixture into an ice-cream maker and churn according to the instructions. Transfer the ice cream to a freezerproof container and freeze until ready to serve. Alternatively, pour the mixture into a freezerproof container and freeze for 3–4 hours, stirring at regular intervals to break up the ice crystals and ensure a smooth ice cream.

GARLIC

Pungent | Sulfurous | Sweet

BOTANICAL NAME
Allium sativum

ALSO KNOWN AS
Camphor of the poor, stinking rose

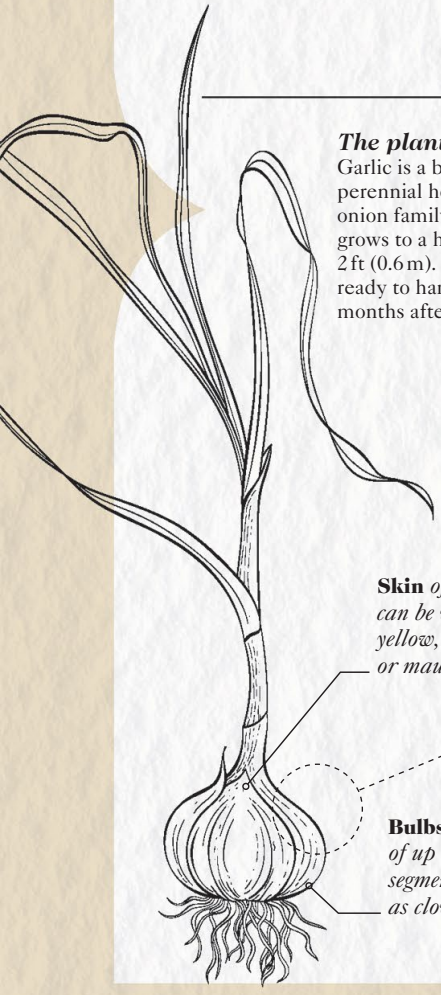
MAJOR FLAVOR COMPOUND
Allicin

PARTS USED
Bulb

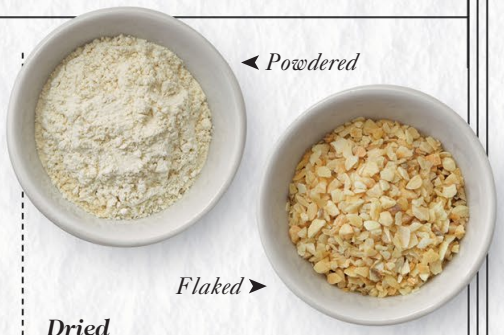
METHOD OF CULTIVATION
The bulbs are harvested when around half the leaves have turned yellow.

METHOD OF PREPARATION
Bulbs are stored in a cool, shady place for 10–20 days so that they lose about one-fifth of their water content.

NON-CULINARY USES
Modern research shows garlic improves cholesterol levels and slightly reduces high blood pressure.



The plant
Garlic is a bulbous perennial herb in the onion family that grows to a height of 2 ft (0.6 m). Bulbs are ready to harvest 5–9 months after planting.



Dried
Dried garlic can be flaked, powdered, or granulated, but all lack the pine and citrusy subtleties of the fresh spice, leaving only the main garlicky sulfur flavors.

Fresh
Mature bulbs tend to have more potent flavor, but avoid any that are showing green shoots (see right).

Spice story

This most potent spice has been prized for over five millennia, by virtually every civilization—the Greek physician Galen praised it as "the great panacea." An Egyptian medical papyrus from about 1550 BCE features 22 different garlic formulas for various ailments. The slaves who built the Egyptian pyramids were given garlic to sustain them and prevent disease. The Chinese cultivated garlic for its stimulating and healing properties, while Roman soldiers ate it before battle for courage and strength. In folklore, garlic has been seen both as a protector from evil spirits or vampires, and as a symbol of the Devil. As a food, its popularity has waxed and waned; it was shunned at Roman and Greek feasts because of its powerful odor, but over time, garlic became integral to many regional cuisines, including Indian and Mediterranean.

Region of cultivation
Probably native to Central Asia, China is now the largest producer and exporter of garlic, followed by India, South Korea, Russia, and the US.

Kitchen creativity

Garlic amplifies and unites other flavors while having its own distinctive taste that gives depth to many savory dishes. Essential to many cuisines, with onions and ginger it forms the "trinity" at the heart of much Asian cooking.

BLENDING SCIENCE

Garlic's pungency derives mainly from its sulfur-containing flavor compounds; these have significant crossover with cooked meats, which also contain sulfur compounds. Smaller amounts of gently aromatic terpenes are also present, including limonene and sabinene. Toasting creates nutty-flavored pyrazines.

ALLICIN
sulfurous / spicy / hot

LIMONENE
citrus / herby

SABINENE
woody / orangey / piney

PYRAZINE COMBINATIONS
nutty / toasty / savory

add depth with similar compounds:

⊕ **asafetida** has a potent range of similar sulfur compounds

⊕ **chili's** capsaicins give depth to garlic heat by stimulating the tongue's temperature receptors

team with other citrusy compounds:

⊕ **ginger** has citral, which shares garlic's lemony sweetness, and also carries heat

⊕ **lemongrass** adds citrus, a sweet, floral aroma and gentle pepperiness

boost piney notes with sabinene:

⊕ **black cardamom** shares sabinene and adds a nose-filling camphor quality and smokiness

⊕ **nutmeg, mace** bring notes of earthy sweetness

pair toasted or fried garlic with other pyrazine-laden spices:

⊕ **toasted sesame** intensifies garlic's nutty accents

⊕ **wattle** brings charred wood aromas and hints of popcorn

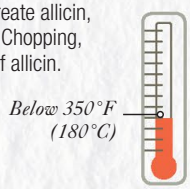
RELEASE THE FLAVOR

A damaged garlic clove releases chemicals that react together to create allicin, the pungent compound we most associate with a "garlicky" flavor. Chopping, crushing, and puréeing produce progressively higher amounts of allicin.

Leave for 60 seconds after crushing or chopping, so allicin levels rise to a peak.

Uninjured cloves do not contain allicin. Cook whole for mild, sweet flavors.

Vegetable oils spread the strongest compounds while butter aids its gentler flavors.



Avoid cooking garlic above 350°F (180°C) to prevent bitterness.

FOOD PARTNERS

⊕ **Roasted lamb** Before roasting, make slits all over the joint and insert slices of fresh garlic.

⊕ **Soup** Roast a foil-wrapped garlic head in the oven, then squeeze out the sweet pulp and add to pumpkin or other vegetable soups.

⊕ **Prawns** Add to an oily marinade for grilled or barbecued prawns.

⊕ **Raw vegetables** Pound garlic with anchovies and olive oil to make the Provençal paste *anchoïade*, and serve with crudités.

⊕ **Chickpeas** Add roasted or raw cloves to the mortar or blender when making hummus.

BLENDS TO TRY

Use or adapt these recipes for classic blends featuring garlic:

Niter kibbeh p.32
Mbongo mix p.35
Nuoc cham p.50
Shichimi-togarashi p.57
BBQ rub p.68

Bitter sprouts

When garlic cloves sprout, they become more bitter. The plant has begun stockpiling defensive bitter-tasting substances, such as phenols and sulfur compounds. Reduce bitterness by cutting out the green shoot before cooking.

ASAFETIDA

Sulfurous | Oniony | Garliclike

BOTANICAL NAME
Ferula assa-foetida

ALSO KNOWN AS
Devil's dung, stinking gum, *hing*

MAIN FLAVOR COMPOUNDS
Sulfides

PARTS USED
Taproot: a resin is produced from the coagulated sap

METHOD OF CULTIVATION
In spring, the stalk base is cut to expose the top of the taproot, which is "milked" every few days for its sap.

COMMERCIAL PREPARATION
The sap is dried to form a dark resin, most of which is ground to a powder and mixed with rice flour and gum arabic.

NON-CULINARY USES
In traditional medicine to relieve flatulence and to treat lung conditions.

The plant

Asafetida is derived from several giant fennel species of the genus *Ferula*, in the carrot family. The plant emits a distinctly foul smell.

Leaves and stems *are edible, and occasionally eaten as a vegetable in Iran*

Huge, carrot-like roots *can be 6 in (15 cm) in diameter*

Ground

Commercial powders are mixed with rice flour, both to prevent the starch-rich spice from clumping and to dilute the flavor for greater control when using the spice.

Whole

In its purest form, asafetida can be bought as small pieces of dried resin, which may be ground or used with water or steam to impart flavor.

Brittle chunks *of pure resin are known as "tears"*

Spice story

Asafetida was discovered in Persia in the 4th century BCE by Alexander the Great's soldiers, who mistook it for silphium, a widely used ancient spice from a similar, and now extinct, plant. They took it to Asia and the Mediterranean region, where it became very popular with the Greeks and Romans as a substitute for silphium. Asafetida was prized both as a seasoning and for its health-giving properties, and is cited in many of the recipes in *Apicius*, a Roman cookbook from the 1st century CE. After the fall of the Roman Empire, it never regained popularity in Europe, but its use was recorded again, centuries later, in the *Baghdad Cookery Book* (1226). In the 16th century, the Mughals are reported to have taken the spice to India, where it became an indispensable element of vegetarian and Ayurvedic cuisine throughout the subcontinent.

Region of cultivation

Asafetida is native to the mountains of Central Asia, from Turkey, Iran, and Afghanistan to Kashmir. It is cultivated mainly in Afghanistan, but also in Iran, Pakistan, and Kashmir. Most of the world's crop is imported by India.

Kitchen creativity

When asafetida is heated in fat, it develops a similar flavor to fried onions and garlic. Because traces of the same sulfurous flavor compounds (sulfides) are found in meat, asafetida can also bring a meaty depth to vegetarian cooking.

BLENDING SCIENCE

Asafetida's flavor-carrying oils are dominated by sulfides, which provide its fried onion smell, making it a suitable partner for similarly flavored spices, such as garlic. Minor compounds contribute more subtle hints of flavor but serve as a helpful guide for further pairings.

SULFIDES
sulfurous / oniony / garlic-like

PHELLANDRENE
peppery / minty / turpentine-like

ACIDS, OCIMENE
sour / citrus / floral

foreground the sulfurous and oniony notes:

- ⊕ **garlic** shares several sulfur-containing flavor compounds
- ⊕ **mustard** has a flavor profile dominated by sulfur-containing compounds
- ⊕ **nigella** has a similar onionlike taste profile

draw out the underlying acidity with fresh, tart spices:

- ⊕ **barberry** contributes a fruity sharpness
- ⊕ **coriander** adds citrus and floral notes

enhnce the piquancy with peppery partners:

- ⊕ **peppercorn** also shares ocimene for fresh heat
- ⊕ **cumin**'s bitter taste and pepperiness from myrcene match those of asafoetida
- ⊕ **grains of Selim** add a complementary penetrating character due to cineole
- ⊕ **bay** highlights fresh woody notes from shared pinine

FOOD PARTNERS

⊕ **Beans and pulses** Fry asafetida in ghee with other warm spices for a moong lentil dhal.

⊕ **Chicken and lamb** Add asafetida to a yogurt marinade for baked or barbecued chicken or lamb.

⊕ **Fish** Sprinkle asafetida over fish kebabs before grilling.

⊕ **Vegetables** Add a small pinch of ground asafetida to give depth to a slow-cooked onion soup; sprinkle a little ground asafetida into cooling oil when making a cauliflower, mushroom, or potato curry.

⊕ **Preserves** Add a pinch of asafetida and turmeric to a pineapple, tomato, or mango pickle or chutney.

BLENDS TO TRY

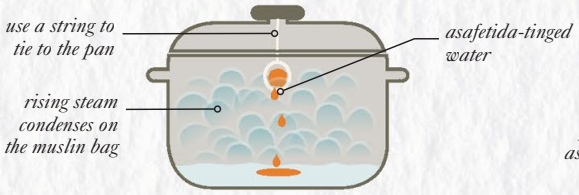
Try these recipes for classic blends featuring asafetida, and why not adapt them with some blending science?

Chaat masala p.42

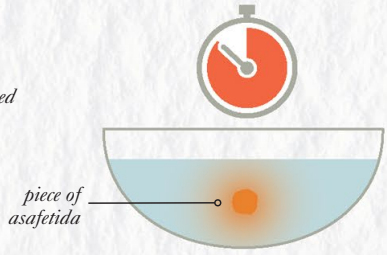
Gunpowder p.45

CONTROL THE FLAVOR

Asafetida's potent oil-based sulfur compounds dissolve very slowly in water, a fact that can be exploited to control the strength of flavor when using whole chunks of resin.



Place a "tear" in a muslin bag and tie it to the underside of the pan lid. Drops of asafetida-tinged water will drip down into the cooking liquid.



Steep a "tear" of the spice in water for several hours to give a flavored water that will be much milder than the raw spice.

CURRY LEAF

Meaty | Warm | Floral

BOTANICAL NAME
Murraya koenigii

ALSO KNOWN AS
Karapincha, *meetha neem*, *kari patta*. Not to be confused with the inedible "curry plant".

MAJOR FLAVOR COMPOUND
1-phenylethanethiol

PARTS USED
Leaves (more accurately leaflets)

METHOD OF CULTIVATION
Leaves are harvested in early summer, before flowering, from trees that are at least three years old.

COMMERCIAL PREPARATION
Fresh leaves are vacuum-packed on their stems and chilled or frozen, or washed and air-dried for 4–5 days.

NON-CULINARY USES
In cosmetics and in traditional medicine as a digestive aid.

Spice story

Curry leaf has a special place in the cuisines of southern India, Sri Lanka, and Malaysia. When the Dravidians of northwest India moved south in around 1000 BCE, they brought with them rice, mustard seeds, and pulses to plant in their new home, and then started combining them with the indigenous curry leaves. The use of curry leaf as flavoring for vegetables is documented in early Tamil literature from the 1st century CE. The botanical name, *Murraya koenigii*, refers to two 18th-century botanists, Johann Andreas Murray and Johann Gerhard König, rather than in tribute to the "kingly" aromatic qualities of the plant. It is grown prolifically in southern India as an ornamental and kitchen garden plant.

The plant
Curry leaves come from a small, deciduous tropical tree in the citrus family.

Dried
Although some recipes say dried leaves can substitute for fresh if double the quantity is added, they really have very little flavor and are best avoided.

Fresh
Leaves are best bought fresh, on the stem. Store in a sealed bag for a week in the fridge, or near indefinitely in the freezer.

Region of cultivation
Native to the foothills of the Himalayas, but spread over millennia to naturalize across India, Sri Lanka, Bangladesh, and Myanmar. It is cultivated mainly in southern India, but also across southeast Asia, in northern Australia, and in the Middle East.

Kitchen creativity

Picked when fresh, curry leaves have a mild, citrusy fragrance that erupts into a musky, floral aroma when bruised or sliced—not at all like curry powder! The flavor is subtle, so the leaves can be used liberally.

BLENDING SCIENCE

Sulfurous compound 1-phenylethanethiol dominates the flavor, which conveys a meaty taste, hyacinth aroma, and sulfurous bite. Smaller amounts of terpenes include floral linalool, pine-scented pinene, penetrating cineole, and peppery myrcene. "Green" hexanal and limonene provide citrusy flavors, present especially in fresh leaves.

1-PHENYLETHANETHIOL
sulfurous / meaty / floral

combine with hot or sulfurous spices:

- ⊕ **asafetida** adds complementary meaty, garlicky tastes
- ⊕ **garlic** contributes heat, a sulfuric tang, and some sweetness
- ⊕ **mustard** brings heat from sulfur compounds and shares subtle pine
- ⊕ **chili** brings heat and fresh fruitiness

PINENE
pinelike / woody / herbal

pair with pinene spices to enhance woody aromas:

- ⊕ **nutmeg** has an undercurrent of pinene, bringing a bittersweet warmth
- ⊕ **black pepper** has both punchy heat and an aroma underpinned by pinene

LINALOOL
floral / citrus / rosewood

foreground the floral with other linalool-carrying spices:

- ⊕ **coriander** is highly floral with a pinelike aroma and citrus edge
- ⊕ **lemongrass** has floral aromas from linalool and nerol; its woody myrcene also complementing pinene

CINEOLE
penetrating / eucalyptus

pair with other penetrating spices:

- ⊕ **grains of paradise** has fruity pepperiness and lingering qualities compatible with cineole
- ⊕ **cardamom** shares eucalyptus qualities
- ⊕ **black cardamom** adds smoky layers
- ⊕ **bay** has a herby aroma, bitter notes, and penetrating tastes

FOOD PARTNERS

⊕ **Eggplant, okra** Fry fresh curry leaves with mustard seeds, cumin, and ginger before adding eggplant or okra and coconut milk, cooking until tender for a simple vegetable side dish.

⊕ **Lamb** Add fresh curry leaves to a garlicky yogurt marinade for lamb before slow-cooking.

⊕ **Seafood** Stir curry leaves into a tomato-based prawn or crab curry; swap European aromatics for curry leaves in *moules marinières*.

⊕ **Eggs** Fry fresh leaves in oil or ghee and drizzle over scrambled eggs.

⊕ **Pulses** Fry fresh leaves in ghee or butter with mustard seeds before stirring into a red lentil dhal.

⊕ **Baking** Add chopped leaves to flatbread dough before baking.

BLEND TO TRY

Use and adapt this classic south Indian spice blend featuring curry leaves:

Gunpowder p.45

RELEASE THE FLAVOR

Fresh curry leaves are best plucked from the stem and lightly bruised just before adding to hot oil. If using dried leaves, they can be ground to increase flavors from this less aromatic form.

Cook immediately in oil or ghee to ensure all the flavorful oils can escape.

For slow-cook dishes, pluck out the leaves after frying and add later to ensure lighter floral notes don't entirely evaporate.

For quick-cook dishes, finely slice or pulverize leaves to ensure the flavor is imparted faster.

MUSTARD

Pungent | Earthy | Sharp

BOTANICAL NAMES
Brassica alba (white), *B. juncea* (brown), *B. nigra* (black)

ALSO KNOWN AS
Indian mustard (brown mustard)

MAJOR FLAVOR COMPOUNDS
Isothiocyanates

PARTS USED
Seeds; leaves are also edible, raw or cooked.

METHOD OF CULTIVATION
The green seed fruits ("pods") are harvested about 4 months after sowing, when full-size but not quite ripe, so they don't split open.

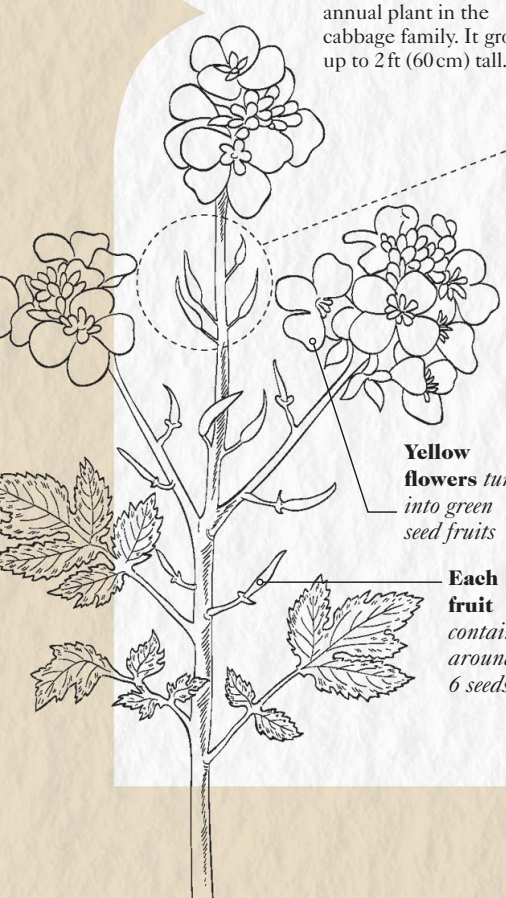
COMMERCIAL PREPARATION
Fruits are stacked in sheaves to dry for about 10 days, then threshed and graded. Seeds for grinding will have their bitter, papery seed coats stripped off.

NON-CULINARY USES
Mustard oil is applied topically to treat muscle aches and arthritis.

Spice story

Mustard seeds have been found in prehistoric sites from China to Europe. First records of the use of mustard as a condiment date back to the ancient Greeks and Romans, who chewed the seeds whole, pulverized and sprinkled them over food, or steeped them in wine. By the Middle Ages, white mustard had made its way to India and China via the Arab trade routes, and brown mustard had traveled overland from its native India to Europe. One method of transporting the powder was to mix it with flour and other spices and form it into balls using honey, wine, or vinegar. The term mustard is thought to come from the Latin *mustum*, the name for the young wine used to mix the ground seeds to a paste.

The plant
Mustard is a fast-growing annual plant in the cabbage family. It grows up to 2 ft (60 cm) tall.



Whole
White mustard seeds are light brown rather than white. Brown and black mustard seeds are smaller.

Powder
Yellow mustard powder is often made from a mixture of white and brown seeds. Once moistened, flavor develops within 10 minutes, but loses its potency after an hour or so unless vinegar is added.

Region of cultivation
White mustard is probably native to the Mediterranean region. It is cultivated in most temperate regions of Europe and in North America, mainly in Canada. Brown mustard is probably native to the foothills of the Himalayas. It is cultivated throughout India.

Kitchen creativity

White mustard seeds have a mild taste and are used in pickling and to make American yellow mustard. Brown mustard seeds are much hotter, often featuring in Indian cuisine. Black seeds have a fine aroma but are less common.

BLENDING SCIENCE

Mustard's heat is produced by sulfur-containing isothiocyanates, which, unlike other pungent compounds, vaporize at body temperature to have a nose-filling pungency. The complex flavour profile also includes pine-like pinene, ground-coffee-like furanmethanethiol, malty, peachy 3-methylbutanal, and popcorn-like 2-acetyl-1-pyrroline. Nutty, roasted pyrazine flavors are produced by toasting the seeds.

ISOTHIOCYANATES
hot / peppery / penetrating

combine with other hot, penetrating spices for rounded pungency:

- ⊕ **chili** adds varying degrees of heat from capsaicinoids
- ⊕ **garlic** brings pungency from allicin, with sweet citrus
- ⊕ **ginger** delivers zesty pungency, adding earthy and floral citrus notes
- ⊕ **black pepper** brings woody warmth

PINENE
woody / pine / herbal

combine with other pinene-containing spices for more woodiness:

- ⊕ **cumin** has pine and slightly bitter earthiness with some peppery aroma
- ⊕ **bay** brings fresh, slightly medicinal herbiness to the mix

PYRAZINES
nutty / roasted / sweet

pair with spices that complement the roasted, nutty flavors:

- ⊕ **nigella** adds earthy, woody flavors with notes of oregano and charred onion
- ⊕ **sesame** seeds contribute harmonizing nutty flavors when roasted

VARIOUS COMPOUNDS
coffee / peach / chocolate

add deep, complex flavor spices:

- ⊕ **cacao** and mustard seed complement each other remarkably well, in both sweet and savory dishes

RELEASE THE FLAVOR

Whole seeds are bland: the hot spicy isothiocyanates are only formed when a defensive enzyme called myrosinase breaks out of damaged cells to act on specific molecules – sinalbin in white mustard, stronger singrin in black and brown. However, myrosinase only functions when water is present.

Create a rich variety of nutty and roasted pyrazine flavor compounds by toasting the seeds before use.

Damage mustard seeds to release the myrosinase enzyme by crushing or cooking them.

Soak cracked mustard seeds in water for several minutes before cooking to allow the myrosinase enzyme to work and so obtain maximum flavor and heat.

FOOD PARTNERS

⊕ **Parsnips** Add a spoonful of whole grain mustard to a creamy parsnip bake.

⊕ **Navy beans** Combine English mustard powder with molasses and add to a navy bean casserole.

⊕ **Rabbit** Add a spoonful of mustard to braised rabbit with tarragon.

⊕ **Fish** Fry brown mustard seeds in ghee with other warming spices, adding tomatoes and onion to make a sauce for fried or steamed fish.

⊕ **Cheese** Sprinkle mustard seeds over strips of puff pastry with grated strong cheese to make cheese straws.

BLENDS TO TRY

Try these recipes for classic blends featuring mustard, or why not adapt them with some blending science?

Panch phoran p.43

Vindaloo paste p.44

GRAINS OF PARADISE

Peppery | Pungent | Fruity-floral

BOTANICAL NAME
Aframomum melegueta

ALSO KNOWN AS
Guinea pepper, Melegueta pepper, ossame

MAJOR FLAVOR COMPOUND
Paradol

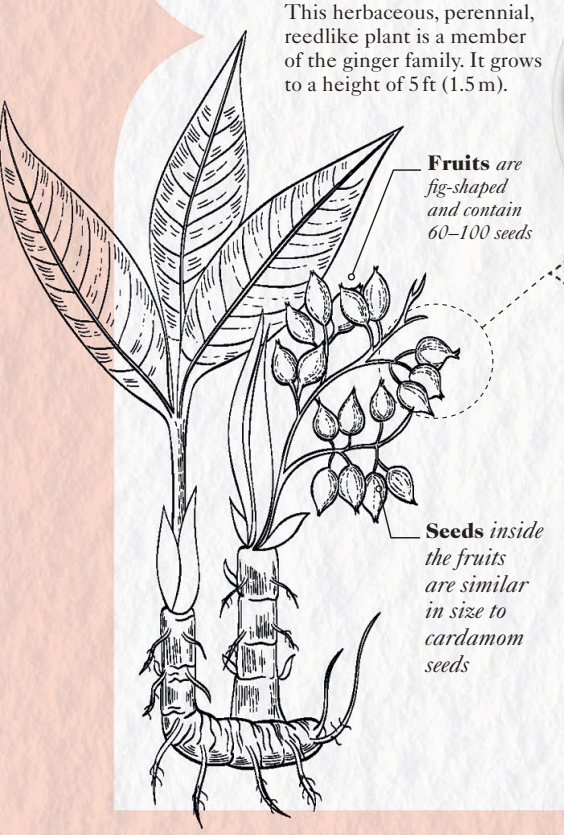
PARTS USED
Seeds

METHOD OF CULTIVATION
Seed pods (fruits) are harvested when the fruit has turned from green to red.

COMMERCIAL PREPARATION
Seed pods are typically dried in the sun. Pods are then opened and the seeds are removed for further drying.

NON-CULINARY USES
To relieve flatulence, freshen breath, and as a stimulant. *Gerard's Herbal* states that the seeds "rid the body of infection."

The plant
This herbaceous, perennial, reedlike plant is a member of the ginger family. It grows to a height of 5 ft (1.5 m).



Fruits *are fig-shaped and contain 60–100 seeds*

Seeds *inside the fruits are similar in size to cardamom seeds*

The tiny seeds are milky-white inside

Whole
Seeds are a reddish-brown color and pyramid-shaped.

Powder
Ground seeds are grayish in color.

Spice story

Grains of paradise originated in West Africa. The spice was first brought to Europe by Arab, Berber, or Jewish merchants, via trade caravan routes across the Sahara Desert. In Europe, it reached its peak of fashionability during the 14th and 15th centuries, when merchants gave it the heavenly epithet as a marketing ploy to increase sales. It was used as a less expensive substitute for black pepper, to spice wine, beer, and as a seasoning for food. Production of the spice was so important that the area of West Africa where it was grown became known as the Grain (or Pepper) Coast. The spice's popularity in Western cuisine had dwindled by the 19th century, but in its native West Africa it remains an important spice in ritual and food; in the Nigerian Yoruba culture it is used as an offering to the spirits.

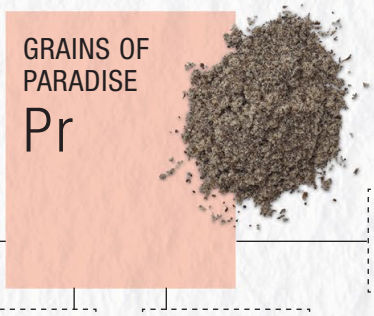
Region of cultivation
Grains of paradise are native to the coastal regions of West Africa, where they grow in forest margins. Ghana is the main producer of the spice.

Kitchen creativity

This spice, with its heat and fragrant, herbaceous notes, is often used in seasoning blends for meat stews and soups in North and West Africa. It can be used instead of or combined with black peppercorns—try adding a few seeds to your pepper grinder.

BLENDING SCIENCE

The slowly developing heat of grains of paradise comes mainly from the pungent compound paradol, and to a lesser extent from gingerol, which gives heat in ginger. Bitterness derives from an acid called humulone, and fragrance from the terpene molecule caryophyllene.



PARADOL
hot / spicy / pungent

GINGEROL
warm / pungent / spicy

HUMULONE
bitter / hoppy / earthy

CARYOPHYLLENE
woody / earthy / hints of clove

match with other peppery compounds:

⊕ **black pepper** has a similar heat to paradol from the piperine compound, and also brings floral notes

⊕ **curry leaf** makes an excellent pairing as it also shares caryophyllene

add bite with another gingerol:

⊕ **ginger** brings a raft of flavor compounds from sweet to citrusy, and its own pungency adds depth to the heat

highlight bitter notes with related humulene:

⊕ **celery seed** adds warmth and earthy aromas, and a savory quality

enhance earthiness with other caryophyllenes:

⊕ **cinnamon** intensifies woodiness and adds warmth with cinnamaldehyde

⊕ **allspice** brings sweetness and clovelike penetrating eugenol

RELEASE THE FLAVOR

The flavor compounds in these small seeds evaporate very quickly and most dissolve poorly in water.

Cooking with oil is essential—most of the flavor and pungency compounds dissolve well in oil and/or alcohol.

Grind seeds immediately before use and add them toward the end of cooking to minimize loss of flavor from evaporation.

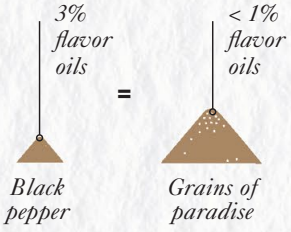
BLEND TO TRY

Use and adapt this classic blend featuring grains of paradise.

Mbongo mix p.35

Pepper substitute

If using grains of paradise as an alternative to black pepper, add two to three times more than you would of pepper.



Black pepper contains three times more flavor-containing oil than grains of paradise.

FOOD PARTNERS

⊕ **Vegetables** Sprinkle ground seeds over an eggplant and tomato stew; grind liberally over root vegetables after roasting.

⊕ **Apples** Grind a couple of seeds and add to apple compote for a citrusy, herbaceous flavor.

⊕ **Rice** Add plenty of ground seeds to the cooking liquid for jollof rice, a West African dish.

⊕ **Lamb** Toast and grind the seeds and sprinkle them over Moroccan-style stewed lamb just before serving.

⊕ **Oily fish** Sprinkle crushed seeds over salmon or tuna steaks before grilling.

⊕ **Drinks** Steep a few seeds in a warm sugar syrup with other aromatics such as pared lemon peel. Allow to cool, then use in gin or vodka cocktails.

SWEET AND SPICY APPLE PASTRY ROSETTES

This beguiling take on a popular pastry treat is inspired by the sweet and peppery flavors of East and West African spiced teas. The sweetness of the apples balances the lingering heat supplied by Scotch bonnet chilis; if you can't find them, use African or Thai bird's eye chilis instead.

SPICE IDEAS

Substitute a **different pungent spice** for the heat of chilis: try black pepper for floral woodiness, or Sichuan pepper for a tingling citrusy heat.

Experiment with the spiced tea flavors by introducing **other sweet and warming spices**, such as allspice and nutmeg.

Introduce toasted, nutty, smoky notes by **adding dried chili flakes** to the apricot jam in place of fresh Scotch bonnet chili.

Makes 6 pastries

Prep time 30 mins

Cooking time 35–40 mins

13 oz (375 g) sheet ready-rolled puff pastry

2 red apples, such as Empire, Jazz, or Pink Lady

juice of ½ lemon

3 tbsp apricot jam

½ Scotch bonnet chili, seeded and thinly sliced

1 tsp grated fresh ginger

½ tsp ground cinnamon

¼ tsp ground cloves

¼ tsp ground grains of paradise

¼ tsp ground cardamom seeds

butter, for greasing

1 Remove the puff pastry from the freezer or fridge and allow it to thaw or come to room temperature, so that it is pliable. Preheat the oven to 410°F (210°C).

2 Cut the apples in half and remove the cores. Cut each half into ⅛in (3 mm) thick, half moon–shaped slices.

3 Put the apple slices in a saucepan with the lemon juice, cover with water, bring to a boil, and simmer gently for 2–3 minutes until the slices are just soft enough to roll up. Drain and dry the slices, then set them aside to cool. Alternatively, place the apple slices in a microwave-safe bowl with the lemon juice and 2 tablespoons of water. Cover with cling film and pierce a hole to let the steam escape. Heat for 2–3 minutes on high, until the slices are softened.

4 Place the apricot jam with the chili and spices in a small saucepan, and heat gently until melted.

5 On a lightly floured surface, roll out the pastry into a rectangle measuring about 12 x 14 in (30 x 36 cm). Slice the dough lengthways into six equal strips.

6 Spread the spiced jam over each strip. Arrange the apple slices lengthways along each strip, overlapping a little, with the skin side of the slices slightly extending beyond the top edge of the strip.

7 Fold the bottom edge of each strip up to meet the top edge. Now roll up the strips to make rose shapes, taking care to keep the apple slices in place.

8 Grease a cupcake tin with butter and place the roses in the holes. Bake for 35–40 minutes until crisp and golden. Serve immediately.

BLACK PEPPER

Hot | Spicy | Citrusy

BOTANICAL NAME
Piper nigrum

ALSO KNOWN AS
Peppercorn

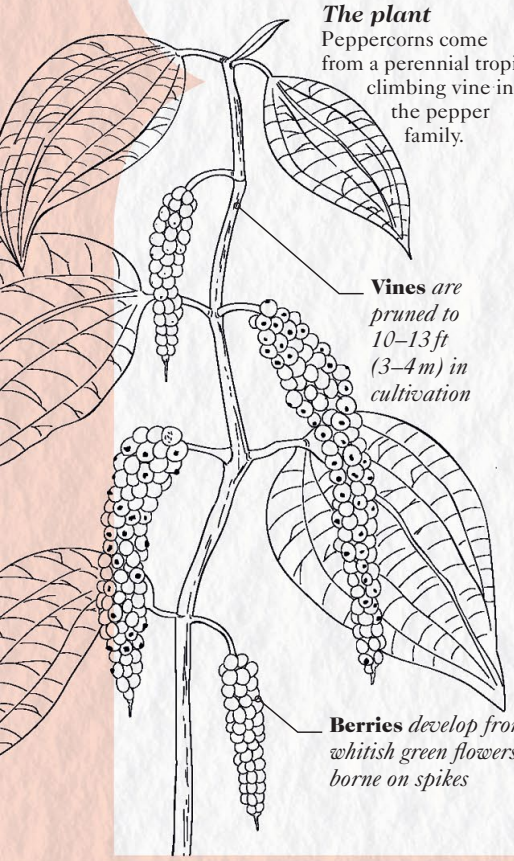
MAJOR FLAVOR COMPOUND
Piperine

PARTS USED
Dried berries, known as "peppercorns"

METHOD OF CULTIVATION
Berries are harvested from vines at different stages of maturity.

COMMERCIAL PREPARATION
Underripe berries are either blanched and left to darken and dry for black pepper, or picked earlier and preserved without darkening for green pepper. Pink pepper is picked after fully ripening.

NON-CULINARY USES
In traditional medicine as a digestive aid.



Whole black
Black peppercorns are dried with their browned, aromatic outer layer intact. Green pepper is less fiery and has more abundant herbaceous flavors.

Whole white
The outer layer of white pepper is stripped by bacterial fermentation, leaving it harsher, less aromatic, and with dunglike nuances.

Spice story

Black pepper is native to southern India and has been cultivated and traded for over 3,500 years. In the 4th century BCE, after Alexander the Great had reached India, black pepper was brought to Europe along newly established trade routes. The highly valued spice quickly became commercially important, and Arab traders established a monopoly on its transport to Europe. By the Middle Ages, black peppercorns had not only become a culinary status symbol, but were also accepted as currency. The Portuguese explorer Vasco de Gama set off to find and take control of the source of this costly spice, and discovered a sea route to southwest India in 1498. For the next century the Portuguese controlled the black pepper trade. In the 17th century they lost their monopoly to the Dutch, who lost it to Britain in the 18th century, when the British Empire took control of the spice trade in the tropics.

Region of cultivation
Black pepper is native to the Malabar coast of southwest India. It is now cultivated mainly in Vietnam, but also in India, Indonesia, Malaysia, and Brazil.

Kitchen creativity

Black pepper produces a pungent heat that is neither flavor nor fragrance, but a painlike sensation very similar to chili heat. The spice also has a woody aroma with floral, fruity, and citrus elements, and some bitterness.

BLENDING SCIENCE

The warming quality of pepper is produced by a pungent alkaloid called piperine. The spice's more subtle flavors are created by terpene compounds, including woody rotundone, pine-scented pinene, lemony limonene, spicy myrcene, floral linalool, and phellandrene, which has fresh lime and green notes.

PIPERINE
hot / pungent / spicy

PINENE
woody / spicy / camphorous

LIMONENE
citrus / herby / turpentine

MYRCENE
piquant / turpentine-like

create rounded, complex heat with other spices in the pungent group:

- ⊕ **chili** offers fruity, grassy, or toasted flavors, depending on variety and if fresh or dried
- ⊕ **mustard** adds bitter warmth and, if toasted, nutty flavors
- ⊕ **Sichuan pepper** has a mouth-tingling quality as well as heat, and also shares citrus-floral elements
- ⊕ **ginger** brings a characteristic heat and additional sweet, citrus notes

foreground coniferous notes in other pinene scented spices:

- ⊕ **bay** brings a floral-herbal aroma, penetrating eucalyptus flavor, and slight bitterness
- ⊕ **black cardamom** contributes meaty and smoky aromas, clovelike taste and eucalyptus
- ⊕ **nutmeg** adds sweetness, musky aroma and a strong, woody earthiness

combine with other sources of limonene or spices that enhance the citrus component:

- ⊕ **cardamom** is sweet, minty, and penetrating
- ⊕ **lemon myrtle** brings intensity to the lemon flavor and lingering eucalyptus
- ⊕ **turmeric** gives earthy warmth with hints of ginger and citrus from citral

coriander adds floral and spicy citrus notes

spices containing myrcene make excellent matches, particularly sweet spices with pink peppercorns:

- ⊕ **cinnamon, anise** both have sweet, warming fragrance and, surprisingly, are among the best pairings for pepper
- ⊕ **allspice** brings sweetness and clovelike tastes
- ⊕ **anardana** adds tart fruitiness, sharing both myrcene and limonene
- ⊕ **juniper** offers strong pinelike flavour with fruitiness and overtones of citrus

FOOD PARTNERS

⊕ **Preserved vegetables** Add whole black or green peppercorns to a brine for preserving roasted bell peppers or fresh cucumber.

⊕ **Fruit** Sprinkle ground pepper over peaches or melon, or macerate strawberries with sugar and a few grinds of black pepper.

⊕ **Steak** Swap black pepper for dried or pickled green peppercorns for a fruitier bite to *steak au poivre*.

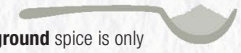
⊕ **Shellfish** Add white pepper to a clam chowder or *moules marinières*.

⊕ **Ice cream** Grind black pepper into vanilla custard before churning to make ice cream.

RELEASE THE FLAVOR

To enjoy pepper's full complexity it is vital to preserve subtle terpene compounds, which quickly break down and evaporate when exposed to air.

Grind whole peppercorns immediately before use to minimize flavor loss.



Pre-ground spice is only good for adding heat.

BLENDS TO TRY

Use and adapt these classic blends featuring black pepper:

Turkish baharat p.23
Chaat masala p.42
Nanjing spice bag p.59
Quatre épices p.74

SICHUAN PEPPER

Pungent | Citrusy | Floral

BOTANICAL NAME
Zanthoxylum simulans

ALSO KNOWN AS
Chinese coriander, Chinese pepper, mountain pepper, *fagara*

MAJOR FLAVOR COMPOUNDS
Sanshools

PARTS USED
Fruits, leaves

METHOD OF CULTIVATION
Fruits are picked in autumn when they are mature and the leaves begin to redden.

COMMERCIAL PREPARATION
The fruits are sun-dried until they split open. The bitter seeds are discarded, and then the fruits are dried further.

NON-CULINARY USES
Used in Chinese herbal medicine as a stimulant to promote digestion. Also used as a diuretic and to treat rheumatism.

The plant
Sichuan pepper comes from a shrub or small tree in the citrus family.

Whole
The spice flavor comes from the fruit's dried husk, rather than from the black seeds inside it.

Powder
Ground Sichuan pepper is available to buy, but is best avoided as the flavors quickly degrade.

Spice story

Sichuan pepper has long featured in the culture and cuisine of China. More than 2,000 years ago, during the Han Dynasty, it was reportedly mixed into plaster to perfume the walls of "pepper houses"—buildings that housed the Emperor's concubines—to warm the rooms and perfume the air. It has also been found in tombs in northern China dating back to a similar period. The pepper was used to spice luxury foods and wines; Hanshan, an 8th century Chinese poet, described lavish dishes of "roast duck tinctured with Sichuan pepper and salt." It was also key in foods prepared as offerings to the gods. Perhaps because the plant bears many fruits and seeds, it was adopted as a fertility symbol, and in some rural areas of China the spice is still thrown over newlyweds, like rice or confetti.

Region of cultivation
Sichuan pepper is native to the Sichuan region of China. It is now cultivated throughout China, Korea, Mongolia, Nepal, and Bhutan.

Kitchen creativity

Sichuan pepper is an essential ingredient in Chinese cooking. It comprises two of the five key flavors of Chinese food, namely hot (or pungent) and bitter (or numbing), the others being salt, sweet, and sour.

BLENDING SCIENCE

Sichuan pepper contains a group of compounds called sanshools, which act on nerves in the mouth and lips to cause numbing, tingling sensations. Fragrance is added by a combination of flavor compounds: linalool, geraniol, limonene, and terpineol. Its sharp qualities come from myrcene and cineole.

SANSHOOLS
hot / numbing / tingling

LINALOOL
floral / woody

LIMONENE
citrus / herby

CINEOLE
eucalyptus / mildly medicinal / penetrating

round out the heat with warming or sweet compounds:

⊕ **star anise**'s mix of penetrating, woody, and sweet compounds adds complexity

⊕ **nutmeg**'s penetrating eugenol and camphene pack enough power to make a match with sanshool

play up floral notes:

⊕ **coriander** shares limonene, plus linalool and peppery myrcene

⊕ **cinnamon** shares linalool and adds spicy woody caryophyllene

add complexity to the citrus profile

⊕ **lemongrass**'s powerful citrus and myrcene components make it an ideal pairing

enhance eucalyptus notes with spices containing cineole:

⊕ **bay** also adds clovelike eugenol

⊕ **galangal** also adds powerful camphor notes

⊕ **cardamom** pairs excellently, sharing linalool and limonene, as well as cineole

Zanthoxylum variations

There are regional variants of Sichuan pepper, which come from slightly different tree species. They have the same core features but can have significantly different flavor profiles.

Sanshō *(Zanthoxylum piperatum)* is the milder version from Japan, with pronounced citrus flavors.

Timur *(Zanthoxylum alatum)* comes from Nepal and has distinctly grapefruit notes.

Andaliman *(Zanthoxylum acanthopodium)* is from Indonesia and has notes of lime and mandarin.

Tirphal *(Zanthoxylum rhetsa)* is grown in the coastal rainforests of India and has a lingering bitterness.

FOOD PARTNERS

⊕ **Vegetables** Fry crushed pepper in oil before using it to stir-fry green beans, asparagus, or cabbage. Sprinkle with ground, toasted pepper.

⊕ **Citrus** Sprinkle toasted, crushed pepper over a tart blood-orange sherbet or lemon sorbet.

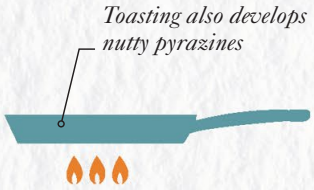
⊕ **Pork, beef** Add whole to slow-cooked pork belly or oxtail with ginger, spring onions, star anise, sugar, and soy.

⊕ **Squid** Add crushed pepper to the batter for deep-fried squid.

⊕ **Noodles** Combine cold cooked noodles, roasted peanuts, spring onions, stir-fried greens, and chili, then drizzle with a pepper- and sesame-infused oil.

RELEASE THE FLAVOR

The thick husks of the peppercorns can impede the release of flavors. Toasting helps the compounds to escape. They can also be ground in a pepper mill and used as a condiment.



Avoid over-roasting, which can cause the loss of the limonene molecules and mask subtler scents with strong pyrazines.

BLENDS TO TRY

Use and adapt these classic blends featuring Sichuan pepper:

Timur ko chhop p.41

Shichimi-togarashi p.57

GINGER

Hot | Citrusy | Woody

BOTANICAL NAME
Zingiber officinale

ALSO KNOWN AS
Ginger root, Canton ginger

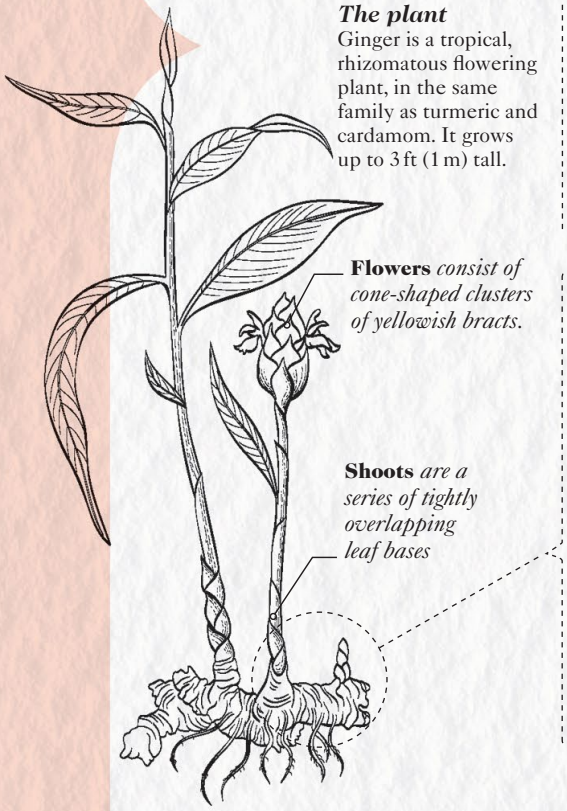
MAJOR FLAVOR COMPOUNDS
Gingerol, shogaol, and zingiberene

PARTS USED
Rhizomes (fleshy underground stems)

METHOD OF CULTIVATION
Rhizomes are harvested 2–5 or 8–10 months after planting if they are to be sold fresh, or are to be dried, respectively.

COMMERCIAL PREPARATION
Fresh: Young rhizomes are cleaned, sometimes bleached, and dried for a day or two. *Dried*: Mature rhizomes are peeled, dried, and ground.

NON-CULINARY USES
Perfumery and cosmetics; in traditional medicine for indigestion and nausea.



The plant
Ginger is a tropical, rhizomatous flowering plant, in the same family as turmeric and cardamom. It grows up to 3 ft (1 m) tall.

Powder
Do not use ground dried ginger in place of the fresh spice, as it has a different flavor profile (see Dry heat, opposite).

Fresh
Avoid older rhizomes with signs of shriveling, which can mean the flesh is fibrous.

Spice story

Ginger was one of the first Asian spices to reach Europe, from around the 4th century BCE, when Arab traders transported dried and preserved ginger to ancient Greece and Rome. The Greeks prescribed it for stomach complaints, and the Romans used it in sauces and to make aromatic salt. By the 9th century CE, dried ginger was regarded as an everyday condiment in Europe. By the Middle Ages it was being widely used in savory and sweet cooking (notably gingerbread), and for flavoring beer and ale. By the 13th century, ginger was being grown in East and West Africa, and by the 16th century it was being cultivated in Jamaica, which still has a reputation for producing quality ginger.

Region of cultivation
Ginger is native to tropical Asia, possibly India. Today it is mainly cultivated on India's Malabar Coast (which produces 50 percent of the world's fresh crop) and throughout tropical and subtropical Asia, but also in parts of Africa, Jamaica, Mexico, North America, and Peru.

Kitchen creativity

Ginger has a hot-spice, citrusy, woody taste. The dried form has a stronger, more aromatic flavor than fresh ginger, and is commonly used in baking and in spice blends. Fresh ginger is widely used in Asian cuisine.

BLENDING SCIENCE

The terpene compound zingiberene carries the characteristic aroma of ginger, but the taste is made more complex thanks to a cornucopia of other compounds, including spicy-hot gingerols, as well as floral linalool and geraniol, herbal curcumene, lemony citral, and eucalyptus-like cineole.

GINGEROLS
hot / pungent / spicy

LINALOOL AND GERANIOL
floral / sweet / herbal

CITRAL
citrus / herbal / some eucalyptus

CINEOLE
eucalyptus / mildly medicinal / penetrating

combine with other pungent spices for added depth:

- ⊕ **chili** adds varying degrees of heat from capsaicinoids
- ⊕ **black pepper** brings a woody warmth from piperine, and some citrus

pair with spices that overlap the floral qualities:

- ⊕ **cinnamon** shares linalool and brings sweet, warming qualities
- ⊕ **nutmeg** shares geraniol and cineole for warm spicy notes
- ⊕ **cacao** adds strong bittersweet and roasted flavors

enhance the zesty flavor with other citrusy spices:

- ⊕ **lemongrass** shares citral and adds mild pepperiness
- ⊕ **lemon myrtle** brings intense lemon, sharing citral and lingering eucalyptus
- ⊕ **coriander** harmonizes with lemony notes

draw out penetrating freshness with cineole-rich spices:

- ⊕ **bay** adds a lingering, clovelike background
- ⊕ **cardamom** provides sweet and herby hints of mint

FOOD PARTNERS

- ⊕ **Squash and coleslaw** Mix grated fresh ginger into Asian-style coleslaws, or fry with the onion base of a squash soup.
- ⊕ **Mango, pears, rhubarb** Pair with mango in creamy puddings, and poach fresh slices with pears and rhubarb.
- ⊕ **Pork** Add slices of fresh ginger to slow-cooked pork dishes to offset the fattiness.
- ⊕ **Fish** Use julienned ginger with shredded leek or spring onions when steaming fish.
- ⊕ **Baking** Try adding ground ginger to carrot cake, lemon cake, and coconut or dark chocolate cookies.

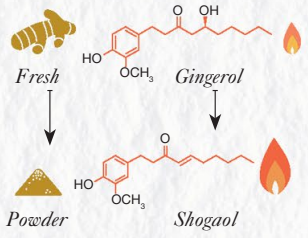
BLENDS TO TRY

Use and adapt these classic blends featuring ginger.

Advieh p.27
Yaji p.36
Leche de tigre p.69

Dry heat

When fresh ginger is dried, its heat pungency increases and a fifth of the flavor molecules evaporate.



The drying process converts gingerol to shogaol, which has twice the heat. The dry spice also has fewer citrus notes.

RELEASE THE FLAVOR

Peel fresh ginger shortly before use in order to retain the complex flavor profile. Heat breaks both gingerols and shogaols into mild zingerone, so the longer that ginger is cooked, the gentler its spicy-heat.

Stripping the skin bursts open the outer layer of cells, allowing fragrant oils to evaporate.

Cooking converts ginger's mouthwarming flavor compounds into the much milder zingerone.

CHILI

Hot | Pungent | Fruity

BOTANICAL NAME
Capsicum annuum, *C. frutescens*, and several other species

ALSO KNOWN AS
Chili pepper, chile, red pepper, hot pepper

MAJOR FLAVOR COMPOUND
Capsaicin

PARTS USED
Fruits (which are in fact berries)

METHOD OF CULTIVATION
Green chilis are harvested unripe, about 3 months after planting. Chilis for dry spice are usually harvested when red and fully ripe.

COMMERCIAL PREPARATION
Chilis are washed and either sun- or oven-dried, pickled, or sold fresh.

NON-CULINARY USES
In creams and ointments to reduce muscle pain; in Ayurvedic medicine to stimulate digestion.

The plant
Chilis are borne by annual or perennial plants in the nightshade family. Around 32 species are cultivated for their fruits.

Unripe fruits *are green; ripe fruits range from yellow to almost black*

Powder
Grinding causes many flavor compounds to evaporate, and powders are best used for adding heat.

Whole dried
Some fragrant substances are lost through the drying process, but new compounds are created, ranging from sweet aniselike flavors to nutty, woody, and roasted nuances.

Fresh
Fruity, citrus, green flavors and sweetness are often prominent in fresh chilis, depending on type and ripeness.

Spice story

Evidence suggests chilis were being cultivated as early as 5000 BCE in South America. According to the Spanish conquistador Hernan Cortez, the ancient Aztecs cultivated a vast range of chilis for use in rituals and adding to chocolate beverages. Columbus brought the newly discovered spice back to Spain at the end of the 15th century CE; he wrongly assumed chilis were related to peppercorns because of their heat and the name has stuck. Portuguese traders transported the spice to their colony in Goa, India, and to Asian and African trading posts, where chilis rapidly replaced black pepper as the hot spice of choice. In 1912, the pharmacologist William Scoville devised a way of measuring chili pungency, which became known as the Scoville Heat Index, but this is now being replaced by more accurate lab-based measures.

Region of cultivation
Chilis are native to Mexico and Central and South America. Production of the dried spice is concentrated in China, South Asia, mainland Southeast Asia, Egypt, Ethiopia, Turkey, and Romania. Indonesia, North Africa, Spain, Mexico, and the US are more noted for growing fresh chilis.

Kitchen creativity

Chilis appear in countless cuisines across the world and are used as much for their flavor as for their heat, particularly in Mexican cooking. Some powders are actually spice blends; "chile" powder and cayenne pepper are generally pure.

BLENDING SCIENCE

Capsaicin is responsible for the heat pungency that can numb the mouth to more subtle flavors. The latter are best appreciated in milder and/or fresh chilis and are produced by plentiful fruity esters, and less common floral undecanol, grassy aldehydes, and citrusy limonene. Drying and smoking chilis creates new flavor compounds, notably earthy, toasty pyrazines and nutty, breadlike furfural.

CAPSAICIN
fiery / numbing / pungent

create rounded, complex heat with other pungent compounds:

- ⊕ **mustard** adds sharp, penetrating pungency and bitterness
- ⊕ **black pepper** adds a woody, lingering heat and citrus notes
- ⊕ **grains of paradise** bring hints of tropical fruit beneath a peppery warmth
- ⊕ **Sichuan pepper** offers citrus, woody, and floral notes, and causes a tingling sensation

ESTERS
fruity / sweet / waxy

enhance the fruity side of mild and fresh chilis:

- ⊕ **cinnamon** brings sweet, penetrating fragrance and warmth
- ⊕ **allspice** brings sweet pepperiness
- ⊕ **cardamom** has penetrating mintiness
- ⊕ **caraway** adds bittersweet, aniselike, citrus flavors

UNDECANOL, LIMONENE
citrus / floral / herby

draw out citrus and floral sides of mild and fresh chilis:

- ⊕ **coriander** offers strong, floral citrus
- ⊕ **ginger** brings sweet citrus notes and refreshing pungency
- ⊕ **lemongrass** has similar citral and slight pepperiness
- ⊕ **ajwain** offers strong, herbal, thyme-like flavor

PYRAZINES, FURFURAL
nutty / roasted / earthy

complement the earthy, roasted flavors of dried and smoked chilis:

- ⊕ **cacao** nibs add toasted, nutty flavors, with floral and citrus notes
- ⊕ **cumin** adds slightly bitter earthiness
- ⊕ **sesame** seeds share furfural and, when toasted, bring harmonizing nuttiness
- ⊕ **turmeric** adds a musky, earthy flavor with hints of ginger

FOOD PARTNERS

- ⊕ **Tropical fruit** Dust chili powder over sliced tropical fruit.
- ⊕ **Tomatoes** Sprinkle smoked chili flakes over chilled gazpacho.
- ⊕ **White fish** Blend soaked, dried chilis and add them to a cherry tomato sauce for grilled or fried white fish.
- ⊕ **Chicken, tofu** Combine dried red chili and Sichuan pepper in a fragrant chicken stir-fry, or substitute tofu.
- ⊕ **Cheese** Mix small amounts of ground chili into dark chocolate desserts, tarts, cookies, or ganache.

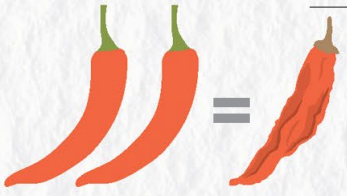
BLENDS TO TRY

Try these blends featuring chili and adapt them with blending science:

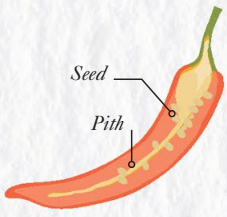
Harissa p.33
Yaji p.36
Timur ko chhop p.41
Vindaloo paste p.44
Gunpowder p.45
Shichimi-togarashi p.57
Chili black bean sauce p.61
Mole mix p.65
BBQ rub p.68
Arrabiata sauce p.76

CONTROL THE HEAT

Don't underestimate chili heat: add with caution! Less fat in a dish will curb heat as capsaicin dissolves in oil, though some related capsaicinoids do dissolve in water.



Dried chilis have more heat than their fresh equivalent: capsaicin concentration roughly doubles after drying.



Remove the inner white pith (or placenta) to reduce heat. "Seeding" is effective only if the pith is removed in the process.

CHILI
varieties

Chilis come in many shapes, sizes, and colors. As a rule of thumb, the smaller and riper a chili is, the hotter it will be. Mexico is unique in having distinct uses for their many chili varieties. Mexican dried chilis should be pliable, not brittle. Wipe them clean, remove the stems and bland seeds, dry-roast, then soak before use.

FRESH CHILIS

Jalapeño
Medium-hot jalapeño chilis are harvested green for using fresh, roasting, or pickling, or left to ripen further for smoke-drying. In Mexico, *jalapeño* refers to pickled chilis; fresh they are known as *cuarescmeno*.

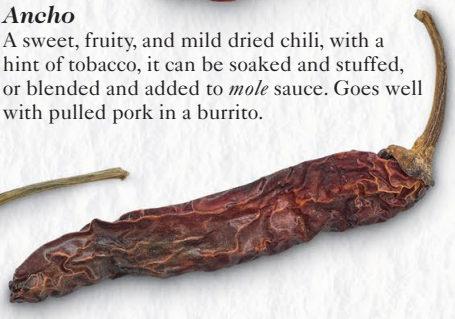
DRIED CHILIS

Guajillo
This is the dark, sun-dried form of the *mirasol* chili. Its smoky sweetness—with just a little heat—peps up classic Mexican tamales, enchiladas, and salsas.

Cascabel
This cherry tomato–shaped Mexican chili—nicknamed the "rattle chili" because its seeds rattle when shaken—is prized for its tropical sweetness without excessive heat.

Ancho
A sweet, fruity, and mild dried chili, with a hint of tobacco, it can be soaked and stuffed, or blended and added to *mole* sauce. Goes well with pulled pork in a burrito.

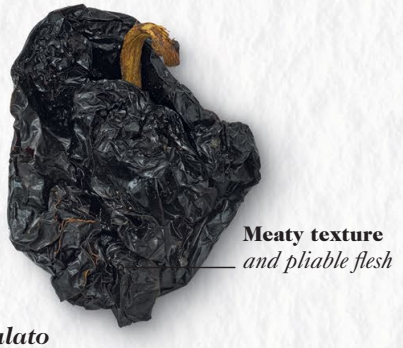
Arbol
This slender, sun-dried chili is widely used in Mexican cuisine to add a bright, fiery flavor with smoky notes. Fry in oil and finely chop, or crush and use as chili flakes.



Kashmiri
The dried Kashmiri chili has an attractive deep crimson color, and unlike many Indian chilis it is only mildly spicy. An essential part of rogan josh and Kashmiri biryani.

Scotch bonnet
Related to the habanero, Scotch bonnet is also extremely hot—it is known in Guiana as "ball of fire"—and has a deep, fruity flavor. It is the preferred chili of the Caribbean.

Bird's eye
Available fresh or dried, this fiery chili is ubiquitous in Asian cooking, especially in the soups, salads, and sambals of southeast Asia and in Chinese stir-fries.



Mulato
Closely related to *ancho*, the *mulato* chili has a smokier taste. Seeded, toasted, soaked, and ground into a paste, it adds intense ripe fruit flavors and a rich, dark color.

Habanero
Bright orange with an intensely fruity aroma, habaneros are an essential part of *cochinita pibil*, a slow-cooked pork dish from Mexico's Yucatán peninsula.

Pasilla
This Mexican staple spice is medium-hot, with a complex, sweet flavor resembling licorice. Works well in sweet recipes, such as chocolate cake.

Piri piri
The tiny piri piri chili (also known as African bird's eye) is milder than the true bird's eye but still intensely spicy. Essential to *molho de piri-piri*, a Portuguese sauce.

GROUND CHILIS

Smoked chipotle
Chipotle is the name given to smoke-dried ripe jalapeños. In addition to smokiness, they have a chocolate-like sweetness. Use ground for fast intensity or whole in slow-cook stews.

Cayenne
The clean, sharp heat of cayenne pepper is typically enjoyed dried and ground. It is an inportant ingredient in Indian and South American cuisine.

Espelette
A legally-protected variety only cultivated in the commune of Espelette in France, it has a citrusy flavor and medium heat. Used in Basque cuisine in meat cures, piperade, and fish stew.

SAFFRON

Grassy | Bitter | Honeyed

BOTANICAL NAME
Crocus sativus

ALSO KNOWN AS
Red gold

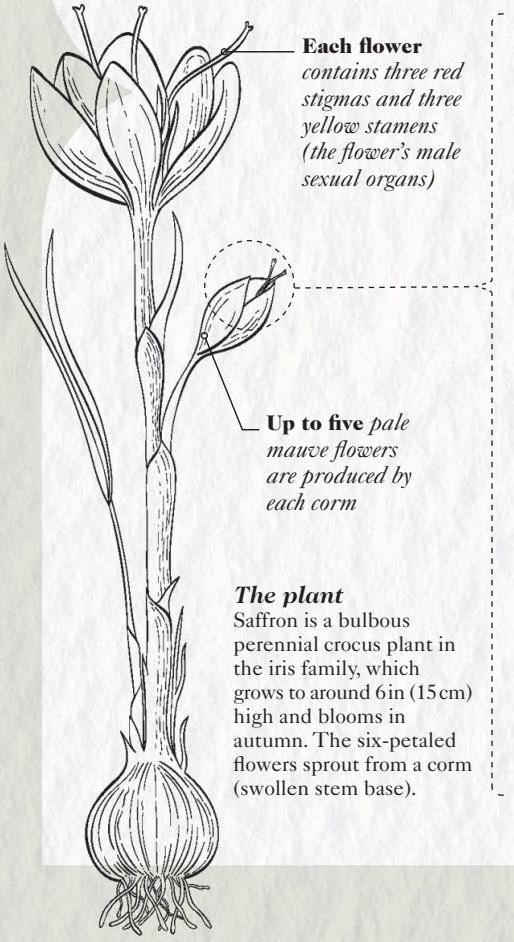
MAJOR FLAVOR COMPOUND
Picrocrocin

PARTS USED
Flower stigmas (female pollen-catching reproductive parts)

METHOD OF CULTIVATION
Harvesting takes place over two weeks in late autumn. Flowers are hand-picked pre-dawn, before they open for the day.

COMMERCIAL PREPARATION
The stigmas are laid out on a sieve, dried, and then transferred to airtight tins.

NON-CULINARY USES
Cosmetic coloring agent and fabric dye; in Ayurvedic medicine as a sedative and to treat coughs and asthma.



Each flower *contains three red stigmas and three yellow stamens (the flower's male sexual organs)*

Up to five *pale mauve flowers are produced by each corm*

The plant
Saffron is a bulbous perennial crocus plant in the iris family, which grows to around 6 in (15 cm) high and blooms in autumn. The six-petaled flowers sprout from a corm (swollen stem base).

Look for *vibrant red strands—duller red-brown or pale stigmas may be stale*

Strands readily *absorb moisture from the air, so keep dry in a sealed container*

Whole strands
More than 6,000 flowers and over 12 hours labor makes just 1 oz (30 g) of saffron, so if it's cheap, be suspicious. Imitation saffron is often odorless and may taste sweet, rather than bitter. Ground saffron is easily adulterated and best avoided.

Spice story

Grown since the Early Bronze Age, saffron has been prized for millennia. Cleopatra is said to have bathed in saffron-scented mare's milk, China's Buddhist monks used it to color their robes, and it was adored by Greeks, Romans, and Indian emperors as food and medicine. As trade routes opened up in medieval times, Arabs took it to Spain and Crusaders to France and England. Britain cultivated it in the Middle Ages, and the Essex town of Saffron Walden is named after the spice that grew there. Owing to its value, saffron has been adulterated for as long as it has been traded, and imitations (turmeric, marigold petals, and safflower) are rife even today. Kashmiri saffron is particularly prized, as is saffron from La Mancha in Spain, which has been granted EU Protected Designation of Origin (PDO) status. Saffron's modern name derives from the Arabic for yellow: *asfar*.

Region of cultivation
Native to parts of the Mediterranean and originally cultivated in Greece, saffron is now mainly grown in Iran, which accounts for 90 percent of world production, as well as Kashmir, Spain, Greece, Afghanistan, and Morocco.

Kitchen creativity

Warm, musky, with the distinctive aroma of cut hay and a slightly metallic tang, saffron's flavor comes in part from compounds unique among the spices. With correct handling, just a pinch will transform a meal.

BLENDING SCIENCE

Picrocrocin gives saffron its lingering, slightly bitter taste, and safranal produces much of its distinctive aroma. Both picrocrocin and safranal are unique to saffron, but their qualities help to determine pairings, as do the small amounts of pinene and the tenacious eucalyptus-like compound cineole.

PICROCROCIN
musky / earthy / warm / bitter

the bitterness withstands other potent compounds:

⊕ **caraway** harmonizes through shared pinene, and its S-carvone has parallels to picrocrocin

⊕ **paprika** brings earthy, smoky aromas that combine with saffron's muskiness

⊕ **black pepper** has gentle pungency, slight bitterness, and shares pinene

SAFRANAL
honeyed / haylike / floral

harmonize with the aroma of safranal:

⊕ **coriander**'s flowery aroma from lilac-scented linalool complements the hay notes of safranal

⊕ **cinnamon, vanilla, allspice, nutmeg** are all sweet spices that work beautifully with the hints of honey in safranal

CINEOLE
penetrating / eucalyptus-like

cineole provides a crucial flavor link:

⊕ **ginger** is a potent, warming match, sharing cineole along with pinene, floral linalool, and sweetly scented geraniol

⊕ **bay** has great synergy thanks to shared cineole and other complementary minor compounds

PINENE
pinelike / woody

draw parallels with other pine and/or fir aromas:

⊕ **garlic** cooked gently has sweetness that, combined with piney, orange-hinted sabinene, make this an important spice for savory saffron dishes

⊕ **sumac** carries a notable pinelike and woody flavor, and its high tannin content mirrors musky, earthy aromas

FOOD PARTNERS

⊕ **Vegetables** Saffron has a particular affinity to earthy vegetables, such as carrots, leeks, mushrooms, squash, and spinach. For rich color and depth of flavor to roasted potatoes, parboil in saffron-infused water then roast with oil mixed with ground saffron.

⊕ **Lemon** Pair saffron and preserved lemon in a Moroccan-style tagine.

⊕ **Rice** Essential to Spanish paellas, saffron also enriches Iranian pilaus, Indian biryanis, and Italian risotto.

⊕ **Lamb** Use to flavor a yogurt marinade for slow-roasted leg of lamb.

⊕ **Fish, shellfish** Poach fish in saffron-infused milk, or add steeped strands to a crab or lobster bisque, *moules marinières*, or Marseille bouillabaisse.

⊕ **Milk** Infuse into milk to make Indian custardlike puddings, ice cream, or reduced-milk candy.

BLEND TO TRY

Use and adapt this classic blend featuring saffron:

Paella mix p.75

RELEASE THE FLAVOR

The key flavor compounds (safranal and picrocrocin) and pigments (crocin) dissolve in water better than in oil, but need time to escape and benefit from steeping; adding directly may leave much still trapped in the threads.

Grind in a pestle and mortar before steeping to speed the release of compounds.

Steep in warm or hot water for at least 20 minutes or up to 24 hours.

Add alcohol to the soaking water to draw out the lesser compounds.

Use milk to help dissolve the lesser flavor molecules through the presence of fat.

SPICED SCALLOPS WITH SAFFRON BEURRE BLANC

Kashmiri cooking is often characterized by the contrast of warm roasted fennel seeds, astringent ginger, and sweet saffron. This trio that travels well across global cooking styles, and is a great match for mushrooms and seafood—both feature in this indulgent dish of scallops in a vibrant take on French butter sauce.

SPICE IDEAS

Make a more **earthy, South Indian–style** spice seasoning by replacing the fennel and ginger with curry leaves and mustard and cumin seeds.

Use a **Mediterranean spice palette** and pair fennel seeds with cumin and hot paprika—smoked if you prefer—instead of ginger.

For **stronger pepper notes**, lightly crack the whole peppercorns, to release more flavor oils, before adding to the *beurre blanc*.

Serves 6 as an appetizer

Prep time 30 mins, plus 1 hour soaking

Cooking time 2 hours 25 mins, plus cooling

For the mushroom and spice seasoning

7 oz (200 g) button mushrooms
2 tsp fennel seeds
1 tsp ground ginger
1 tsp salt

For the *beurre blanc*

small pinch saffron strands
3 tbsp white wine vinegar
4 tbsp white wine
1 shallot, finely diced
6 black peppercorns
¾ cup (175 g) unsalted butter, cubed
½ lemon

For the scallops

12 large scallops, roe removed
2 tbsp extra virgin olive oil
4 tbsp mushroom and spice mix
2 tbsp chives, snipped

1 Grind the saffron strands to a powder using a pestle and mortar, and leave to soak in 2 tablespoons of warm water for 1 hour.

2 For the spiced mushroom seasoning, heat the oven to 250°F (120°C). Thinly slice the mushrooms and spread out in a single layer on a baking tray lined with baking parchment. Bake for 2 hours, or until the mushrooms are crisp. Remove from the oven and leave to cool.

3 Heat a small frying pan over medium heat and toast the fennel seeds for 1 minute, until fragrant. Grind the toasted seeds to a powder.

4 Put the mushrooms in a small food processor and add the fennel, ginger, and salt. Process until coarsely ground, and set aside. The mix will keep for 2–3 weeks in a tightly lidded jar.

5 For the *beurre blanc*, pour the vinegar and wine into a small pan and add the diced shallot and peppercorns. Bring to a boil, and then simmer for 4–6 minutes, until it has reduced to 1–2 tablespoons and looks syrupy.

6 Strain the liquid and discard the shallots. Whisk in the saffron and its soaking water. Return the liquid to the rinsed-out pan and cook for about 15 minutes over a low heat, whisking in the butter gradually, one cube at a time. The sauce will emulsify and thicken so that it just coats the back of a spoon. Season and sharpen the sauce with a squeeze of lemon, and keep it warm.

7 Heat a dry frying pan over medium heat. Brush both sides of each scallop with olive oil and lightly coat with the spiced mushroom mix. Cook the scallops for 1–2 minutes on each side, depending on their size. Take care not to overcook—they are ready when they are opaque but still tender.

8 Divide the *beurre blanc* between six shallow bowls and top each with two scallops. Sprinkle with the chives and serve immediately.

POPPY

Nutty | Mild | Green

BOTANICAL NAME
Papaver somniferum

ALSO KNOWN AS
Opium poppy, maw seed

MAJOR FLAVOR COMPOUND
2-Pentylfuran

PARTS USED
Seeds

METHOD OF CULTIVATION
Seed pods are harvested mechanically in the fall when the petals fade and the seed heads turn from green to yellow-brown.

COMMERCIAL PREPARATION
The pods are dried, then cracked open to collect the seeds.

NON-CULINARY USES
Poppy seed oil is used in the cosmetics industry. Several painkillers and sedatives are manufactured from the plant's unripe seed pods.

The plant
Opium poppy is a summer-flowering annual herbaceous plant that can grow to 4 ft (1.2 m) high.

Ripe pods *make a rattling sound when shaken*

Seed pods *have a ribbed outer shell containing several chambers holding hundreds of tiny seeds*

Leaves *can be cooked and eaten like spinach*

Seeds *appear round at first glance, but are in fact kidney-shaped*

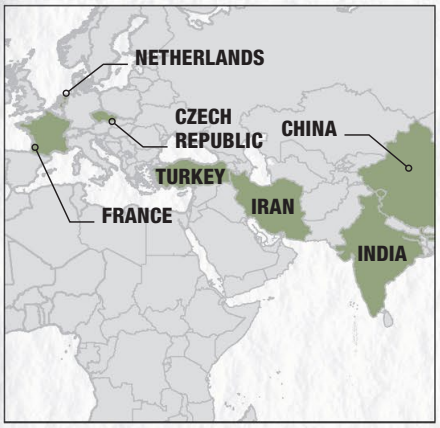
Black
The blue-black variety of seeds is the most widely cultivated. The hard raw seeds have a mild taste and almost no aroma.

1 gram *contains about 3,300 tiny seeds*

White
The pale variety of seeds is popular in Indian cooking and is most often ground to add richness and as a thickener for sauces.

Spice story

Poppy seeds were cultivated as early as 3500 BCE by the Sumerians of modern-day southern Iraq, and later, in around 2000 BCE, the Hittites of Anatolia used them in bread making. In a first-century novel by Petronius, a wealthy Roman serves dormice at his banquet, glazed in honey and rolled in poppy seeds. Through Arab traders, poppy cultivation spread along the Silk Road from Arabia and Persia to India and China. Although its use declined after the fall of the Roman Empire, the spice regained popularity in Europe in the Middle Ages. The botanical name "somniferum" translates as "sleep bearing," and refers to the use of the plant to produce the drug opium. However, opium is made from the "sap" of unripe seed pods rather than from the ripe seeds used for cooking, which do not have the same effect.



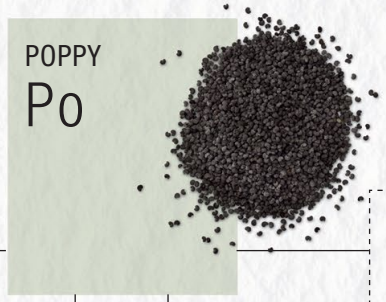
Region of cultivation
Native to the western Mediterranean and southwest Asia, poppy is cultivated in the Netherlands, France, the Czech Republic, Turkey, Iran, India, China, and Canada.

Kitchen creativity

Poppy seeds lend themselves to a variety of dishes, from pickles and kormas to cakes, bagels, and buns. The blue-gray seeds are used in central and eastern European and Middle Eastern cuisines, and the creamy-yellow seeds are used in Asian cooking.

BLENDING SCIENCE

Poppy seeds are rich in linoleic acid, which makes the taste buds more sensitive to sweet, salty, and savory tastes, while dampening down bitterness. The seeds are also packed with green and grassy aldehyde flavour compounds, in particular 2-pentylfuran and hexanal. Other important flavor compounds include balsamic vinyl amyl ketone, and citrusy limonene.



VINYL AMYL KETONE
earthy / creamy / musty

HEXANAL AND 2-PENTYLFURAN
fruity / green / grassy

LIMONENE
citrus / herby / turpentine

PYRAZINES
nutty / caramel / smoky

pair with spices that contain vinyl amyl ketone or enhance its flavor:

⊕ **mahleb** carries vinyl amyl ketone and adds cherry notes

⊕ **licorice** is strongly sweet with penetrating aniseed

⊕ **cinnamon** contributes sweet, warming qualities

enhance underlying green notes:

⊕ **chilis**, particularly mild varieties, contain the freshness of hexanal, and add warmth

⊕ **bay** is a good match thanks to it also carrying some leafy hexanal

pair with another limonene to enhance the zesty side:

⊕ **coriander** also brings gentle floral qualities

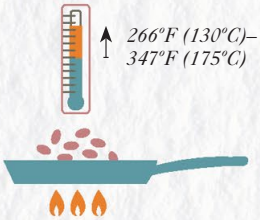
emphasize the sweet nutty flavors of toasted seeds:

⊕ **sesame** seeds also contain hexanal and, once toasted, harmonize with the pyrazine flavors

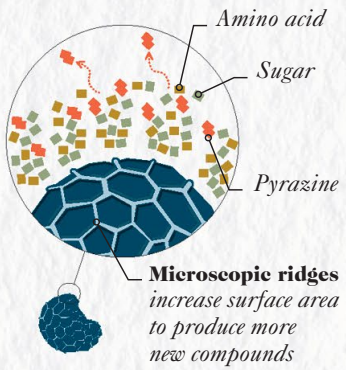
⊕ **paprika** brings earthy sweetness; smoked varieties work particularly well with toasted poppy seeds

RELEASE THE FLAVOR

Poppy seeds contain a particularly diverse range of amino acids, which means that, when toasted, they produce a remarkable mix of sweet, earthy, nutty, onionlike, and smoky flavors.



Temperatures over 266°F (130°C) are needed to create new compounds, but burned, bitter flavors will predominate over 347°F (175°C), due to the small seed size and fragile oils.



When heated, amino acids and sugars in the seeds react with each other to produce new flavor compounds, most importantly pyrazines.

FOOD PARTNERS

⊕ **Vegetables** Sprinkle the black seeds over potato purée or celeriac remoulade to add visual and textural contrast. Scatter over carrots before roasting.

⊕ **Sweet baked goods** Give the moist crumb of an almond and lemon or orange cake a nutty crunch by adding a spoonful of seeds to the batter. Combine with honey and drizzle over baklava.

⊕ **Pastry** Add a spoonful of seeds to savory shortcrust pastry dough for a quiche or a cheese and leek tart.

⊕ **Fruit** Add to a honey and citrus dressing for fruit salad.

⊕ **Oily fish** Ground white seeds work well with Indian spices to make a sauce for trout or salmon.

AJWAIN

Bitter | Herbaceous | Peppery

BOTANICAL NAME
Trachyspermum ammi

ALSO KNOWN AS
Ajowan, ajave, carom, Ethiopian cumin, omum, bishop's weed

MAJOR FLAVOR COMPOUND
Thymol

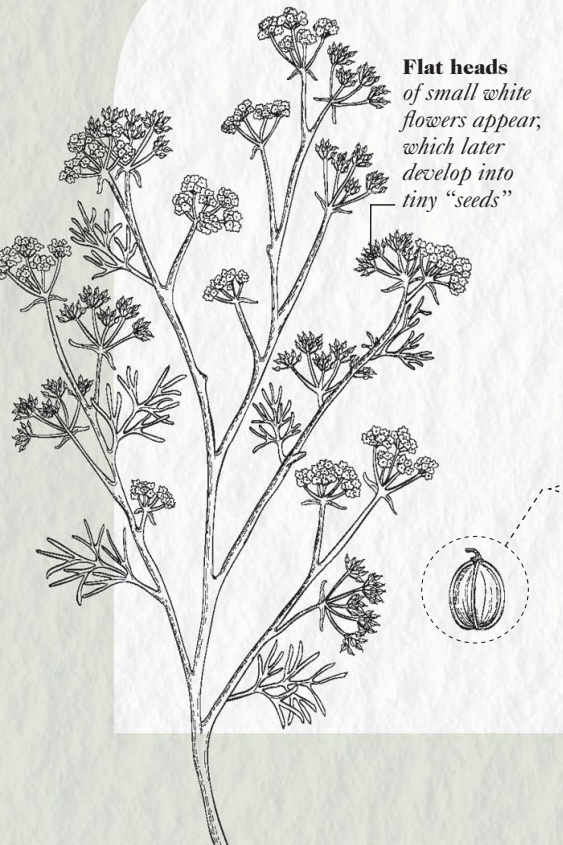
PARTS USED
Seeds (technically fruits)

METHOD OF CULTIVATION
The stems are cut when the seeds are ripe, around two months after flowering.

COMMERCIAL PREPARATION
Stems are dried, threshed, and sieved; seeds are then graded and grouped by size.

NON-CULINARY USES
In perfumes; as an antiseptic agent in toothpastes; in Ayurvedic medicine to treat digestive disorders, rheumatism, arthritis, and fevers.

The plant
Ajwain is a small annual plant in the parsley family, and is closely related to caraway and cumin.



Flat heads *of small white flowers appear, which later develop into tiny "seeds"*

Powder
Ground ajwain is available to buy and is less bitter than whole or fresh ground seeds, but adds a much weaker flavor to a dish.

Oval seeds *are greyish-green and resemble those of caraway*

Whole
South Indian seeds have the highest levels of thymol (up to 98 percent of the flavor compound molecules). Whole seeds retain a strong flavor for a very long time.

Spice story

Ajwain was valued as a medicinal spice from ancient times, and was probably first cultivated in Egypt. The Romans believed it to be a variety of cumin—hence the common name "Ethiopian cumin." It is believed to have reached India, where it became popular, via the spice caravans at around the same time as cumin seed, soon after 750 CE. It was given a number of misleading names—"celery seed" and "lovage seed" were the most common ones—which persist to this day, even though the taste is very different. For centuries, regions of India practicing Ayurvedic medicine have been making a cure-all tonic "omam water" from ajwain seeds. Although the plant is now mainly cultivated for its potent essential oil, ajwain is one of the defining spices of the vegetarian cuisine of the west Indian state of Gujarat.

Region of cultivation
Ajwain is probably native to the Middle East, possibly Egypt. It is now cultivated mainly in India and Iran, but also in Pakistan, Afghanistan, and Egypt.

Kitchen creativity

The flavor of ajwain has been described as a mixture of anise, oregano, and black pepper. Its bitterness can be reduced by toasting or frying it. Ajwain is highly aromatic and pungent, so use it cautiously.

BLENDING SCIENCE

Ajwain and thyme have similar taste profiles: they both share the same main flavor compound, thymol, which is also found in oregano. This powerful phenol works alongside equally penetrating or herbal spices, while the lesser terpene compounds provide opportunities for bringing out citrus and woody, spicy flavors.

AJWAIN
Aj

THYMOL
thymelike / penetrating / cooling

CYMENE AND TERPINENE
turpentine-like / limelike / woody

MYRCENE
peppery / balsamic / celerylike

pair with other penetrating and/or herbal compounds:

- ⊕ **bay** contains sweetly herbal terpineol and penetrating eugenol
- ⊕ **nutmeg** features cooling neolignans as well as eugenol
- ⊕ **nigella** contains thymoquinone, which has similar aromas to thymol

complement the peppery notes with another myrcene:

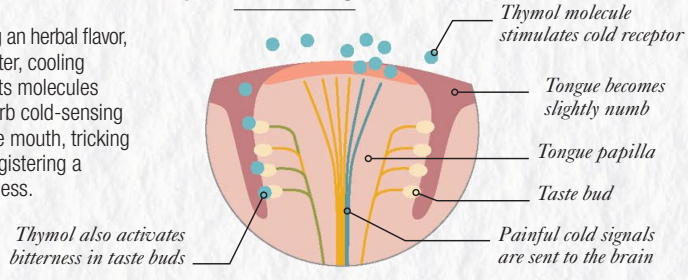
- ⊕ **black pepper** also adds slow-burning pungency and floral notes

boost the citrus and woody notes of these less abundant compounds:

- ⊕ **coriander** shares cymene and terpinene, along with citrusy limonene
- ⊕ **cardamom** shares terpinene and brings a cool edge of eucalyptus
- ⊕ **cumin** brings musky warmth from shared cymene
- ⊕ **caraway** adds a similarly citrusy flavor from limonene

Thymol's cooling effect

As well as having an herbal flavor, thymol has a bitter, cooling effect because its molecules chemically disturb cold-sensing pain fibers in the mouth, tricking the brain into registering a sensation of iciness.

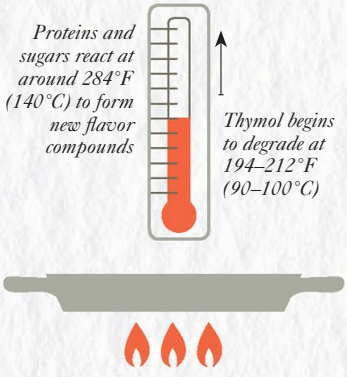


FOOD PARTNERS

- ⊕ **Fish** Combine bruised ajwain seeds with chili powder and turmeric to make a dry rub for whole or filleted fish. Then fry or oven bake.
- ⊕ **Vegetables** Add lightly crushed ajwain seeds to a chickpea flour batter for vegetable fritters or onion bhajis.
- ⊕ **Lentils** Add whole seeds to melted butter or ghee for an aromatic tempering for lentil soup or dhal.
- ⊕ **Breads** Fry ajwain seeds in oil, ghee, or butter and drizzle over flatbreads, chapatti, or naan.
- ⊕ **Eggs** Fry a pinch of seeds in butter or ghee, and add gently beaten eggs to make Parsi-style scrambled eggs.

RELEASE THE FLAVOR

For a more rounded taste, dry roast the whole seeds to create compounds with nutty, roasted flavors, particularly pyrazines. This also dampens the penetrating icy quality because some of the thymol will evaporate and degrade.



CELERY SEED

Bitter | Savory | Lemony

BOTANICAL NAME
Apium graveolens

ALSO KNOWN AS
Smallage, wild celery

MAJOR FLAVOR COMPOUND
Sedanolide

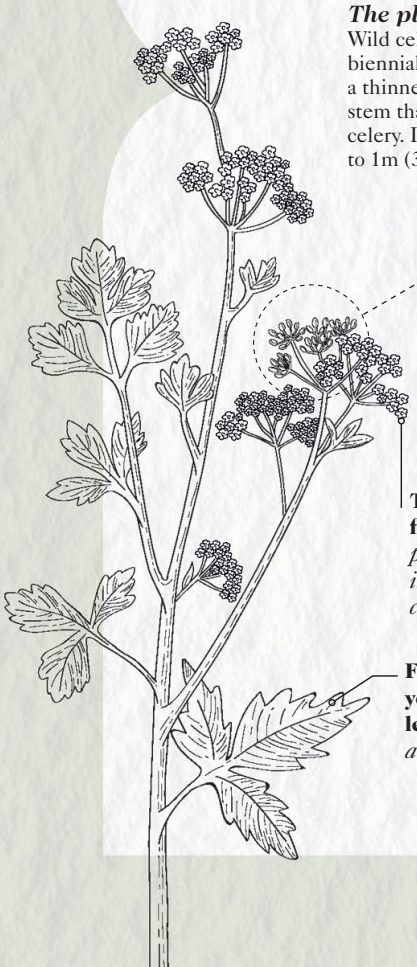
PARTS USED
Seeds (which are technically fruits)

METHOD OF CULTIVATION
The plant is cut at ground level when the seeds are mature and gray-brown in color.

COMMERCIAL PREPARATION
The seeds are left to dry for a few days, and then threshed, cleaned, and further dried.

NON-CULINARY USES
Perfumery; in herbal medicine for water retention, arthritis, and gout; in Ayurvedic medicine as a nerve stimulant and tonic.

The plant
Wild celery is a biennial herb. It has a thinner, less fleshy stem than cultivated celery. It grows up to 1m (3ft) tall.



Tiny cream flowers *are produced in clusters called umbels*

Feathery, yellow-green leaves *are aromatic*

Whole
Use whole seeds and grind them as required. They can be stored in a sealed container in a cool, dark place for up to 2 years.

Ridged *seeds are up to 5mm (¼in) long*

Powder
Ground celery seed is available to buy, but quickly loses its flavour.

Spice story

Wild celery has been cultivated for over 3,000 years, and was widely used by the ancient Egyptians, Greeks, and Romans as a panacea, and was grown in most of their herb gardens. The Romans also added the bitter seeds and leaves to bread, wine, soups, cheese, and other foods. By the 6th century CE, wild celery had been introduced to China. Meanwhile in Europe its use spread north to France and England. In medieval Europe it was believed to cure every kind of illness, and was reputed to be an aphrodisiac. By the 17th century, a new, sweeter form of the plant was being cultivated in Italy for use as a vegetable; this is the celery we know today. Its wild relative—smallage—was relegated to seed production, and is still the main source of celery seed.

Region of cultivation
Wild celery is thought to be native to temperate regions of Europe and western Asia. It is cultivated specifically for its seed mainly in India (which produces more than 50 percent of the world's total crop), but also in China, Egypt, and France.

Kitchen creativity

Celery seeds are more intensely flavored than the stalks and leaves, with a warm, concentrated, earthy taste, lingering bitterness, and hints of grassiness, but without the freshness of the vegetable. Use them judiciously in soups, sauces, and vegetable dishes.

BLENDING SCIENCE

The most abundant flavor compound in celery seeds is citrus-scented limonene, with lesser amounts of herbal-tasting selinene and woody, spicy humulene. However, the unique herbal taste of this spice is produced by unusually potent lactone compounds called phthalides, which are present in only trace amounts but have a profound effect on the overall flavor.

PHTHALIDES
herbal / sweet / grassy

LIMONENE
citrus / herby / turpentine

HUMULENE
woody / spicy / bitter

pair with spices that contain traces of these flavour compounds:

- ⊕ **caraway** brings complex, aniselike, peppery flavors
- ⊕ **cardamom** adds eucalyptus notes and a sweet mintiness
- ⊕ **cumin** lends an earthy warmth
- ⊕ **ajwain** contributes a strong thyme flavor

pair with other spices that carry some limonene to balance the bitterness:

- ⊕ **black pepper** gives lingering pungency and woody notes
- ⊕ **coriander** brings its distinctive floral qualities, with lemon and pine aromas

pair with other spices containing humulene, or with spices that also have woody nuances:

- ⊕ **grains of paradise** enhance the spicy bitterness
- ⊕ **allspice** provides sweet, clovelike warmth
- ⊕ **bay** has woody bitterness with complex eucalyptus, lemon, and floral scents

FOOD PARTNERS

- ⊕ **Tomatoes** Sprinkle seeds sparingly over grilled tomatoes or a tomato tarte tatin.
- ⊕ **Potatoes** Toss celery seeds in melted butter and drizzle over new potatoes.
- ⊕ **Fish** Add the seeds to a fish chowder, or to the batter for fish goujons.
- ⊕ **Beef** Add a few seeds to pepper as a spice rub for beef brisket.
- ⊕ **Savory baked goods** Add to savory bread dough, cheese biscuits, or oat biscuits for serving with cheese.
- ⊕ **Eggs** Sprinkle lightly toasted seeds over scrambled or deviled eggs.

RELEASE THE FLAVOR

Flavors dissolve best in oil, but several of the flavor compounds in celery seed are sensitive to temperatures at either end of the hot–cold spectrum.

Bitter substances are destroyed by heat. Toast seeds at the start of cooking to mellow the bitterness.

Phthalides turn to vapor when seeds are ground, but chilling beforehand helps to slow the rate of evaporation.

Homemade celery salt

Not just for a Bloody Mary, celery salt is a flavorful alternative to ordinary salt that works well with soups, cold salads, and dips. Use a ratio of 1 part celery seed to 6 parts salt.

Toast the celery seeds lightly in a dry frying pan to remove moisture.

Crush the toasted seeds with sea salt using a pestle and mortar, adjusting the quantities to taste.

TURMERIC

Woody | Floral | Bitter

BOTANICAL NAME
Curcuma longa

ALSO KNOWN AS
Indian saffron, false saffron

MAJOR FLAVOR COMPOUNDS
Turmerone and ar-turmerone

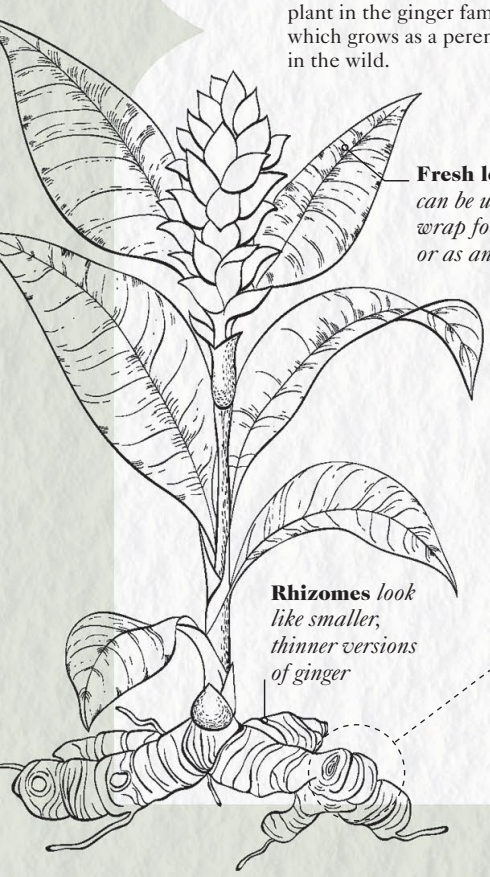
PARTS USED
Rhizomes (fresh, dried, or powdered); occasionally fresh leaves

METHOD OF CULTIVATION
This annual crop is grown in heavily manured furrows; rhizomes are harvested when the leaves turn yellow.

COMMERCIAL PREPARATION
Rhizomes are boiled and dried; they are then sold whole or ground to a powder.

NON-CULINARY USES
Fabric dye; coloring agent in cosmetics; in traditional medicine as an anti-inflammatory and antimicrobial agent.

The plant
Turmeric is a leafy tropical plant in the ginger family, which grows as a perennial in the wild.



Fresh leaves *can be used to wrap foods or as an herb*

Rhizomes *look like smaller, thinner versions of ginger*

Ground turmeric *is less staining than the fresh spice*

Powder
There are two main types: Madras (above) is brighter yellow and sweeter in taste than the pungent, earthy, ocher-colored Alleppey turmeric, which is more prized.

Fresh
Zesty flavors are more prominent in raw rhizomes. Peel and then chop or grate them, like ginger.

Spice story

The flavor and properties of turmeric were first appreciated by the ancient Vedic culture of India over 3,000 years ago. The spice still forms a major part of many Indian masala blends, and is used in Hindu rituals to symbolize the sun. Turmeric's influence on Persian and North African cooking dates back to the pre-Christian era, when it first reached these regions via the caravans and ships of the Spice Routes. Ottoman traders introduced turmeric to Europe in the early medieval period, although it was mainly used as a cheap alternative to saffron. The spice gained popularity in Britain during the era of Imperial India, when returning colonial officers recreated the flavors of the Raj with an all-purpose "curry powder," of which turmeric was (and still is) a major constituent.

Region of cultivation
Turmeric is thought to be native to India. It is cultivated mainly in that country (which produces 90 per cent of all tumeric powder), but also in China, Thailand, Cambodia, Malaysia, Indonesia, and the Philippines.

Kitchen creativity

Turmeric works well in complex blends, where its pungent earthiness acts as a base to help to bind other flavors together. Add sparingly if it is to be used on its own, so the bitter notes do not overwhelm.

BLENDING SCIENCE

Turmeric's dominant earthy notes are produced by the flavor compounds turmerone and ar-turmerone ("ar-" for "aromatic"), which are found in few other spices. The minor compounds provide more opportunities for effective pairing. Focus on one compound for a particular taste effect, or mix and match several.

TURMERIC
Tu

TURMERONE AND AR-TURMERONE
earthy / musky / woody

add depth with other earthy spices:

⊕ **cumin** gives a rich, warming earthiness

⊕ **paprika** brings toasted, smoky, and sweet notes from pyrazines

⊕ **black cardamom** brings smokiness and penetrating menthol from shared cineole

CINEOLE
penetrating / eucalyptus

use more cineole spices for floral and menthol notes:

⊕ **anise**, **star anise** easily overpower, so use sparingly

⊕ **nutmeg** will also help to develop the musky flavors

CITRAL
citrus / herbal / eucalyptus

enhance fresh notes with more citral:

⊕ **cardamom** also adds penetrating camphorous accents

⊕ **coriander** brings zesty fruit and floral aromas, and can be added generously

ZINGIBERENE
pungent / sharp / spicy

boost the heat with more zingiberene or spices with different pungency:

⊕ **ginger** also adds complexity due to shared zingiberene

⊕ **black pepper** adds pungency due to piperine, which complements the pungency of turmeric's zingiberene

Cooking with curcumin

The incredible staining power of ground turmeric is due to a pigment called curcumin, but you may be surprised to discover that its hue can vary according to how it is used and stored.

Acid effect
Acids, such as lemon juice, help to retain the yellow color.

Alkaline effect
Alkaline substances, such as baking soda, turn it orangey-red.

Iron reaction
Toasting or frying in an iron skillet will darken the spice.

Photosensitivity
Exposure to light destroys the pigment, so store it in the dark.

FOOD PARTNERS

⊕ **White fish** Stir together turmeric, yogurt, and crushed garlic, and then spoon over fish fillets before grilling.

⊕ **Lamb and pork** Combine with paprika, lightly crushed cumin, and oil for a meat rub, and massage into the skin before roasting.

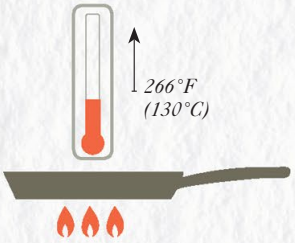
⊕ **Squash and cauliflower** Mix a teaspoonful with oil and honey, and toss with the vegetables before roasting.

⊕ **White chocolate** Add a good pinch to cupcake batter along with chunks of white chocolate.

⊕ **Pickles** Include thin slices of fresh rhizome in fish and vegetable pickles.

RELEASE THE FLAVOR

Frying in fat causes flavor compound molecules to disperse and form new compounds. This only happens above 266°F (130°C), so does not occur in boiling water.



BLENDS TO TRY

Use and adapt these recipes for classic blends featuring turmeric:

Hawaij p.29

Niter kibbeh p.32

Malaysian fish curry paste p.51

Bumbu p.52

FENUGREEK

Bittersweet | Warm | Musty

BOTANICAL NAME
Trigonella foenum-graecum, *T. caerulea* (blue fenugreek)

ALSO KNOWN AS
Goat's horn, Greek hayseed, Greek clover

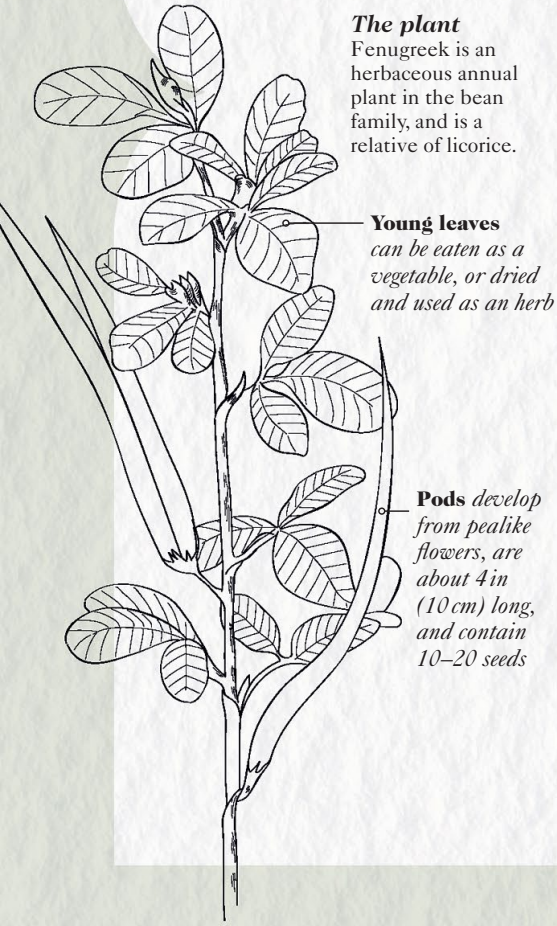
MAJOR FLAVOR COMPOUND
Sotolon

PARTS USED
Seeds; young leaves

METHOD OF CULTIVATION
When the seed pods are ripe, plants are pulled up, bundled together, and dried for about a week.

COMMERCIAL PREPARATION
The stems are threshed to release the seeds, which are then dried and graded.

NON-CULINARY USES
As a dye; in herbal medicine as a digestive aid and stimulant; in Ayurvedic medicine for hair loss and skin complaints.



The plant
Fenugreek is an herbaceous annual plant in the bean family, and is a relative of licorice.

Young leaves *can be eaten as a vegetable, or dried and used as an herb*

Pods *develop from pealike flowers, are about 4 in (10 cm) long, and contain 10–20 seeds*

Whole
The angular, brownish-yellow seeds have a furrow running across one side.

Blue fenugreek powder
The ground leaves and seeds of blue fenugreek have a milder, less bitter flavor than ordinary fenugreek and are used in Georgian cuisine (see p.77).

Spice story

The oldest fenugreek seeds were found at an archaeological site in Iraq, and date back to 4000 BCE. Seeds were also found in the 3,000-year-old tomb of the Egyptian pharaoh Tutankhamen: the Egyptians regarded fenugreek as a panacea. By Roman times, the plant was such a common crop that it was used as fodder for cattle—its name comes from the Latin for "Greek hay." Its use as a spice crop was mentioned in the 1st century CE by the Greek physician Dioscorides in *De Materia Medica*. At athletic games held by the Syrians a century later, it was a component of a ritual perfume with which participants were anointed. By the Middle Ages, fenugreek was being cultivated as a medicinal herb in Europe. Today it is frequently used in Iranian, West Asian, Indian, and Sri Lankan cuisine, and has spread around the world via commercial curry powder, of which it is a key ingredient.

Region of cultivation
Fenugreek is native to the eastern Mediterranean region and southwest Asia. It is cultivated mainly in India, but also in Mediterranean countries and North Africa.

Kitchen creativity

Fenugreek seeds have a sweet, strong taste, with hints of caramel, maple syrup, burned sugar, and coffee. While its musty aroma is not to everyone's liking, the spice provides a savory, bittersweet background for many dishes.

BLENDING SCIENCE

Fenugreek's flavor is dominated by sotolon, a sweet lactone compound with a taste like brown sugar with hints of cotton candy. This spice also has woody caryophyllene, with some buttery diacetyl, and mushroomlike vinyl amyl ketone. Pyrazines give toasted seeds roasted, smoky flavors. The sweaty, rancid, musty aromas are produced by a trio of fragrant acids, which some people dislike.

SOTOLON
sweet / maple syrup / caramel

PYRAZINES
nutty / roasted / smoky

CARYOPHYLLENE
woody / spicy / bitter

pair with spices that enhance the sweet flavor:

- ⊕ **licorice** has anise- and eucalyptuslike flavour
- ⊕ **carob** has rich vanilla sweetness, with a similar sweaty aroma from acids
- ⊕ **allspice** brings peppery sweetness and also shares caryophyllene
- ⊕ **cinnamon** has penetrating sweetness and warmth, as well as shared caryophyllene

use other caryophyllene-carrying spices to enhance the woody aromas:

- ⊕ **clove** adds astringent, distinctive floral woodiness
- ⊕ **annatto** contributes gentle earthiness and a mild flavor
- ⊕ **curry leaf** adds warming, meaty, sulfurous complexity
- ⊕ **black pepper** has mild pungent heat as well as woody qualities and citrus notes

pair with earthy or woody spices that complement the roasted flavors:

- ⊕ **cacao** adds bittersweet toasted flavors from roasting, alongside fragrant acids
- ⊕ **cumin** when toasted has warm, earthy, bitter flavors
- ⊕ **turmeric** adds harmonizing muskiness with hints of ginger
- ⊕ **paprika** shares smokiness and adds sweet warmth

FOOD PARTNERS

- ⊕ **Pumpkin, sweet potato** Soak fenugreek seeds and add to the base of a pumpkin or sweet potato stew.
- ⊕ **Walnuts** Use blue fenugreek to make the Georgian spiced walnut paste *satsivi*, which can be enjoyed as a dip or used for flavoring meat stews.
- ⊕ **Beef, lamb** Add toasted and soaked fenugreek seeds to add depth to a rich beef or lamb curry.
- ⊕ **Fish** Fry toasted, ground fenugreek seeds in ghee or coconut oil before mixing in fish chunks and coconut milk for a Keralan-style curry.
- ⊕ **Baking** Add soaked and pounded seeds to savory yeasted breads.
- ⊕ **Preserves** Add the ground seeds to fruit chutneys and relishes.

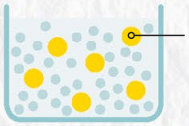
BLENDS TO TRY

Use and adapt these classic blends featuring fenugreek:

Niter kibbeh p.32
Durban curry masala p.37
Panch phoran p.43
Vindaloo paste p.44
Khmeli-suneli p.77

RELEASE THE FLAVOR

Fenugreek seeds can help diffuse flavors throughout a dish and thicken sauces by the action of a special emulsifier called galactomannan.



Galactomannan in seeds forms a gel in a liquidy dish, allowing oil and water to mix.

Extract galactomannan by soaking seeds in water overnight or by simmering.

Grind the seeds so galactomannan releases faster. Ground fenugreek can be added directly to a dish.

Lightly toast seeds to create nutty, coffee-and-chocolate roasted pyrazine flavors.

SPICED FILIPINO ADOBO WITH CHICKEN AND PORK

This spicy take on the usually mild Filipino dish imagines what it might taste like had the nation embraced more influences from the spice trade. A classic adobo is made with pork and chicken, but you could use just one or the other—or make a meat-free version with sturdy vegetable chunks, such as butternut squash.

SPICE IDEAS

Replace the first three sweetly fragranced spices with a **more earthy mix** of cumin, paprika, and turmeric.

Use sulfurous spices, such as mustard, curry leaves, and asafetida, to **emphasize the meatiness** of the dish.

Alter the citrus-sour profile by replacing the vinegar with tamarind water and adding lemongrass to the paste mix.

Serves 4–6

Prep time 25 mins

Cooking time 1 hour

seeds of 5 cardamom pods

1 star anise

1 in (2.5 cm) piece of cinnamon

½ tsp roasted chili flakes or chili powder

1 tsp black peppercorns

6 garlic cloves, peeled

2 in (5 cm) piece of fresh root ginger, roughly chopped

2 tbsp coconut oil or vegetable oil

6 spring onions, chopped

2 tbsp palm sugar or muscovado sugar

2 lb (1 kg) chicken thighs and drumsticks

10 oz (300 g) pork tenderloin, cut into chunks

½ cup (100 ml) coconut vinegar or white wine vinegar

½ cup (100 ml) dark soy sauce

1 cup (250 ml) chicken stock

3 bay leaves

1 Place the cardamom seeds, star anise, cinnamon, chili flakes, and peppercorns in a pestle and mortar, and grind vigorously until the spices have been pulverized. Add the garlic and ginger, and pound to a rough paste.

2 Put a heavy-based pan or wok on medium heat, add the oil and spice paste, and stir-fry for 2–3 minutes, until the garlic and ginger become fragrant and begin to color.

3 Stir in the spring onions and sugar, then add the chicken and pork. Stir to coat them with the spice mix.

4 Pour in the vinegar, soy sauce, and chicken stock. Add the bay leaves and bring to a boil.

5 Reduce the heat and cover the pan—use foil if your pan does not have a lid. Simmer gently for 1 hour, until the meat is tender and the liquid has reduced. Serve with steamed rice and stir-fried greens.

WORLD OF SPICE FURTHER RECIPES

The following recipes for classic dishes from around the world are as delicious as they are authentic; each features one of the traditional spice blends or sauces from the World of Spice chapter (pp.18–77).

LAMB KOFTE

Makes 12

Prep time 20 mins, plus 20–30 mins soaking

Cooking time 8–10 mins

¼ cup (50 g) bulgur wheat
¼ cup (50 g) apricots, roughly chopped
½ cup (100 ml) boiling water
1 lb (500 g) lamb mince
1 small onion, finely chopped
1 tbsp pine nuts
2 cloves garlic, peeled and crushed
1 tbsp chopped fresh mint, plus extra leaves to serve
3 tbsp *baharat* spice (see p.23)
salt, to taste
flatbread, red onion, tomatoes, and plain yogurt, to serve

1 Put the bulgur and apricots into a small pan. Pour over ½ cup (100 ml) boiling water, cover, and set aside for 20–30 minutes, until all the liquid is absorbed.

2 Put lamb, onion, pine nuts, garlic, and mint in a bowl with 1 tbsp of *baharat* spice and a pinch of salt, and mix together with a fork. Add the bulgur and apricots and knead the mixture until it forms a paste and holds together well.

3 Divide the lamb mixture into 12 portions and roll each portion into a ball.

4 Sprinkle the remaining 2 tbsp of *baharat* spice onto a plate, and then roll each ball to coat it evenly with the spice.

5 Thread a skewer through the center of each ball, and squeeze the ball into a sausage shape about 3–4 in (8–10 cm) long around the skewer.

6 Preheat a grill or a griddle pan to medium–high heat. Cook for 8–10 minutes, turning until crisp and evenly browned on the outside and cooked through in the center. Cook in batches if necessary.

7 Serve with flatbread, topped with sliced red onion, diced tomatoes, fresh mint leaves, and a dollop of yogurt.

PERSIAN RICE PUDDINGS

Serves 6

Prep time 15 mins, plus up to 1 hour infusing

Cooking time 45–50 mins

½ cup (150 g) short-grain white rice, washed
2½ cups (600 ml) full-fat milk
1¼ cups (300 ml) heavy whipping cream
2 tbsp honey
strip of zest from 1 orange
2 tsp orange flower water
1 vanilla pod, split and seeds scraped out
pinch saffron strands, ground to a powder
1 tbsp *advieh* spice mix, plus extra to serve (see p.27)
6 Medjool dates, pitted and roughly chopped
1 tbsp pistachio kernels, cut into slivers
1 tbsp dried rose petals

1 Preheat the oven to 325°F (160°C).

2 Divide the rice between six 7 fl oz (200 ml) ramekins.

3 Combine the milk, cream, honey, orange zest, orange flower water, vanilla pod and seeds, and ground saffron in a large, heavy-based saucepan. Set over medium heat, stirring until the honey dissolves and the saffron turns the milk pale yellow.

4 Heat to just below boiling point, then turn off the heat and allow to infuse for at least 10 minutes, or up to 1 hour.

5 Strain the milk, discarding the zest and vanilla pod, and divide between the six ramekins, pouring it over the rice. Sprinkle the advieh spice mix over the surface of each pot.

6 Cook for 45–50 minutes or until the rice is completely soft and the spice has formed a thin brown skin on top.

7 Remove the pots from the oven and allow to cool a little.

8 Top each pudding with chopped dates, pistachios, and dried rose petals. Sprinkle over a little more of the advieh and serve warm or cold.

DURBAN BEEF BUNNY CHOW

Serves 4

Prep time 30 mins

Cooking time 40–50 mins

2 tbsp olive oil
2 black cardamom pods
2 small cinnamon sticks
1 tsp fennel seeds
1 large onion, chopped
2 tbsp Durban curry masala (see p.37)
2 tsp fresh root ginger, grated
4 garlic cloves, peeled and crushed
2 tbsp tomato purée
2 ripe tomatoes, roughly chopped
1lb (500 g) lean stewing beef, cut into ½–¾in (1–2 cm) pieces
1 large potato, cut into ½–¾in (1–2 cm) pieces
12 fresh curry leaves, or 6 dried curry leaves
1¼ cups (300 ml) water
salt and freshly ground black pepper, to taste
handful fresh cilantro, chopped, plus extra to garnish
½ lime
2 small white crusty bread loaves (a 5½ x 3 loaf pan is perfect), halved and hollowed out

1 Heat the oil in a large pan, and then fry the cardamom, cinnamon, and fennel seeds for a minute or so, until aromatic.

2 Add the onion, and soften for 5–8 minutes over medium heat.

3 Sprinkle the masala and stir to coat the onions, then add the ginger, garlic, and tomato purée, and cook for 1 minute.

4 Add the tomatoes, stir, and cook for 4–5 minutes, until the mixture becomes saucelike.

5 Stir in the beef, potatoes, curry leaves, and water. Season with salt and pepper.

6 Bring to a simmer, cover, and cook for 40–50 minutes, stirring occasionally, until the meat is tender and the potatoes are soft.

7 Stir in the cilantro plus a squeeze of lime to taste. Remove and discard the cinnamon, cardamom, and curry leaves before serving.

8 Divide the curry between the four half loaves of bread, spooning it into each hollowed-out half. Garnish with the extra cilantro and serve immediately.

CHANA MASALA WITH SWEET POTATO AND SPINACH

Serves 4

Prep time 20 mins

Cooking time 30–35 mins

1 tbsp vegetable or coconut oil
1 tsp cumin seeds
1 large onion, roughly chopped
2 garlic cloves, crushed
¾ in (2 cm) fresh root ginger, peeled and grated
2 tsp ground coriander
1 tsp paprika
1 tsp ground turmeric
1 medium sweet potato, peeled and cut into ¾ in (2 cm) chunks
1 (14.5 oz) can chopped tomatoes
2 (14.5 oz) cans chickpeas in water, or ¾ cup (200g) dried chickpeas or chana dhal, soaked overnight then cooked in fresh water until tender, cooking water reserved
1–2 green chilis, cut into chunky pieces
salt, to taste
2½ oz (75 g) baby spinach, washed
1–2 tsp garam masala, to taste (see p.40)
½ lemon
naan bread, to serve

1 Heat the oil in a large, heavy-based pan over medium–high heat. When the oil is hot, add the cumin seeds. Fry for a minute or so until aromatic, add the onion, and then reduce the heat. Cook for 5–8 minutes until softened.

2 Add the garlic and ginger and stir for a minute or so, then add the ground coriander, paprika, and turmeric, stirring for a further 2 minutes.

3 Add the sweet potato and turn it to coat it well with the spices.

4 Stir in the tomatoes and chickpeas with their liquid. Alternatively, if using dried chickpeas or chana dhal, add about 1¼ cups (300ml) of the reserved cooking water. Stir in the chili pieces (include the seeds for extra heat), bring to a simmer, then turn the heat to low, cover, and cook for 25–30 minutes, until the potatoes are tender and the sauce has thickened. Season with salt.

5 Add the spinach, and stir for 3–4 minutes until it wilts.

6 Stir in the garam masala, and squeeze in some lemon juice to taste. Adjust the seasoning, then serve immediately with warmed naan bread.

MASOR TENGA FISH CURRY

Serves 4

Prep time 10 mins, plus 10–15 mins marinating

Cooking time 30 mins

4 sea bream or gray mullet fillets, de-scaled, with skin on
½ tsp salt
1 tsp ground turmeric powder
2 tbsp oil, such as coconut or rapeseed
1 tsp yellow mustard seeds, coarsely ground
1 tbsp *panch phoran* (see p.43)
1 onion, sliced
2 green chilis, seeded and halved lengthways
2 ripe tomatoes, roughly chopped
1 tbsp yellow mustard paste
1–2 tsp red chili flakes
½–¾ cup (150–200 ml) water
juice of 1 lime
handful of fresh cilantro leaves, to garnish
rice, to serve

1 Place the fish on a plate and rub with the salt and turmeric. Cover, and set aside for 10–15 minutes.

2 Melt half the oil in a frying pan over medium–high heat and add the mustard seeds. Stir for a few minutes until they become fragrant. Lay the fish in the pan, skin side down, and leave to cook for 3–4 mins. Once the skin is crisp and golden, turn and cook for another 2–3 minutes until the fish is just cooked through. Transfer the fried fish to a plate, cover, and set aside.

3 Heat the remaining oil in the pan over high heat, and add the *panch phoran*. Let the seeds splutter and pop for 1 minute.

4 Turn the heat down to medium and stir in the onion and chilis. Fry gently for 3–4 minutes, until they are just softened and golden.

5 Now stir in the chopped tomatoes and cook for 4–5 minutes until they soften.

6 Add the mustard paste with the chili flakes and cook for another 4–5 minutes, stirring.

7 Pour in water, and then add lime juice to taste. Bring to a gentle simmer.

8 Carefully add the fried fish pieces back into the sauce, skin side up, and heat through for 2–3 minutes.

9 Garnish with chopped cilantro leaves and serve with rice.

GOAN VINDALOO

Serves 4

Prep time 30 mins, plus 1 hour or overnight marinating

Cooking time 30–40 mins

2 tbsp olive oil
1 lb (500 g) skinless, boneless chicken thighs or pork shoulder, cut into 1 in (3 cm) chunks
1 medium eggplant, cut into ¾ in (2 cm) chunks
1 batch vindaloo paste (see p.44)
2 large garlic cloves, peeled and crushed
2 in (5 cm) fresh root ginger, peeled and grated
2 tbsp coconut oil
1 large onion, roughly chopped
2 ripe tomatoes, cut into chunks
1–2 green chilis, thickly sliced
1 cup (250 ml) chicken stock
1 tbsp jaggery or soft brown sugar, plus extra if needed
1 tbsp coconut or cider vinegar
salt, to taste
handful cilantro leaves, to garnish
rice, yogurt, and lime pickle, to serve

1 Put the chicken or pork and eggplant in a bowl, and stir in the vindaloo paste along with the garlic and ginger. Mix well, cover, and marinate for at least 1 hour, or refrigerate and leave overnight if preferred.

2 Preheat the oven to 375°F (190°C).

3 Heat the oil in an ovenproof pan and fry the onion over a low heat for 10–15 minutes, until soft and golden.

4 Add the meat and eggplant, along with the marinade, and cook, stirring, for 4–5 minutes to brown all over.

5 Now add the tomatoes, chilis, and stock, and bring to a simmer. Stir in the jaggery and vinegar until the sugar has dissolved.

6 Cover and transfer to the oven. Cook for 30–40 minutes, until the chicken is tender, the eggplant is soft and melting, and the sauce has thickened. Taste and adjust the seasoning.

7 Sprinkle with cilantro and serve immediately with rice, yogurt, and lime pickle.

PRAWN SUMMER ROLLS

Makes 12

Prep time 45 mins

4 oz (100 g) dried vermicelli rice noodles or bean thread noodles, or use a 10 oz (300 g) pack of cooked rice noodles
12 round rice paper wrappers, 8 in (20 cm) in diameter
handful Thai basil
24 cooked prawns, cut in half lengthways
2 or 3 large iceberg lettuce leaves, torn into 12 pieces
1 carrot, grated
½ cucumber, cut into 2 in (5 cm) long matchsticks
2 spring onions, cut lengthways into strips
handful cilantro leaves
handful mint leaves
4 tbsp salted peanuts, roughly chopped
1 lime, halved
nuoc cham dipping sauce, to serve (see p.50)

1 Soak the dried rice noodles, if using, in a bowl of hot water for 3 minutes, then drain and rinse with cold water. They should be just tender, but not too soft.

2 Lay out all the ingredients ready to make the rolls. Dip one of the rice papers in a bowl of hot water, moving it around for 10–15 seconds until the whole wrapper is pliable but not completely soft. Lay it on a board and pat dry with a tea towel.

3 At the bottom edge of the wrapper, place three Thai basil leaves face down, side by side, and then lay four prawn halves on top in a horizontal row.

4 Place a piece of lettuce on top of the prawns, followed by some noodles, a few strips of carrot, cucumber, and spring onions, then some cilantro and mint leaves, and finally the nuts. Squeeze a little lime juice over the vegetables. Do not overfill the rolls or they will be hard to shape.

5 Lift the edge of the rice paper wrapper nearest to you over the filling and, holding the filling in position with your fingers, tuck it under and start rolling tightly.

6 When you are about halfway, fold the ends of the rice paper in and over the filling. Continue rolling the filling as tightly as possible so that it is completely enclosed, and press lightly to ensure that it has stuck.

7 Repeat with the other wrappers and the remainder of the fillings. To serve, cut the rolls in half on the diagonal, and serve at room temperature with the *nuoc cham* dipping sauce.

8 If you are making the rolls in advance, cover them with cling film or a damp tea towel to prevent them from drying out.

NANJING SALTED DUCK

Serves 4

Prep time 20 mins, plus overnight marinating

Cooking time 15 mins, plus 2 hours cooling

2 tbsp salt
2 tbsp whole Sichuan peppercorns, lightly crushed with a pestle and mortar
2 whole duck legs, about 7 oz (200 g) each
2 duck breasts, about 6 oz (175 g) each
1 Nanjing spice bag (see p.59)
2 in (5 cm) fresh root ginger, sliced, and then pulverized using a pestle and mortar
3 spring onions, trimmed and cut into large segments
½ cup (125 ml) Shaoxing wine
2 tsp sesame oil

1 Heat a frying pan over medium heat. Add the salt and Sichuan peppercorns and toast them, stirring, for 5–8 minutes until the salt turns yellow/brown. Let the pan cool.

2 Lightly score the skin of the duck pieces with a sharp knife. Rub the salt and peppercorns into the skin and flesh, cover loosely with foil, and then marinate overnight in the fridge.

3 When you are ready to cook the duck, lay all the pieces in the bottom of a large pan with the salt and peppercorns. Cover with 6–8 cups (1.5–2 liters) of water. Add the spice bag, ginger, and spring onion. Bring to a boil, then add the Shaoxing wine. Reduce the heat, and simmer gently for 15 minutes.

4 Turn off the heat and allow the duck to cool in the liquid, with the pan covered.

5 Transfer the duck to a cutting board and discard the cooking liquid, or strain and reserve it for use as stock.

6 Drizzle the sesame oil over each piece of duck. Cut the breast into thick slices, and divide the legs in half between the joint to separate the leg and thigh. Eat warm, or leave to cool. Serve 1 piece of leg and some sliced breast per person.

PRAWN AND VEGETABLE STIR-FRY

Serves 4

Prep time 10 mins

Cooking time 10 mins

9 oz (250 g) fine egg thread noodles
2 tbsp peanut oil
1 onion, peeled and cut into chunks
1 red pepper, seeded and cut into chunks
1 in (2 cm) fresh root ginger, peeled and cut into matchsticks
2 large garlic cloves, peeled and sliced
9 oz (250 g) large, raw prawns, peeled and de-veined
4 oz (100 g) baby corn cobs, sliced in half on the diagonal
2 tbsp light soy sauce
2 tbsp Shaoxing wine, or similar rice wine
juice of half a lime
4 oz (100 g) fresh snow peas
1 tbsp five-spice powder (see p.60)
2 tbsp black sesame seeds
2 tbsp toasted sesame oil

1 Put the noodles into a saucepan and pour boiling water over them. Cover and leave to stand while you make the stir-fry.

2 Heat the oil in a large frying pan or wok, and stir-fry the onion and pepper over a high heat for 2 minutes, until softened and slightly charred.

3 Add the ginger, garlic, and prawns, stirring constantly for 2 minutes until the prawns are just pink.

4 Add the baby corn to the pan with the soy sauce and wine. Simmer for 1 minute.

5 Stir in the snow peas and five-spice powder, then remove from the heat.

6 Drain the noodles, and stir in the sesame seeds and oil. Serve immediately with the hot stir-fry.

PIPARKAKUT

Makes about 40

Prep time 20 mins, plus cooling, chilling, and resting

Cooking time 10–12 mins

1 tbsp (60 g) honey
1 tbsp (60 g) blackstrap molasses
½ cup (125 g) unsalted butter
½ cup (100 g) dark brown sugar
2¼ cups (350 g) all-purpose flour, plus extra for dusting
1 tsp baking soda
1 tbsp Finnish gingerbread spice (see p.72)
¼ tsp ground white pepper
1 egg
2 tbsp chopped crystallized ginger, to decorate (optional)

1 Put the honey, molasses, butter, and sugar into a saucepan, then place on low heat, and melt all the ingredients together.

2 Once melted, set aside to cool for at least 10 minutes.

3 Sift the flour, baking soda, spice mix, and pepper into a large mixing bowl, and stir them together.

4 Pour the molasses mix into the flour mix.

5 Crack in the egg, then stir the ingredients together to form a smooth, dark paste.

6 Cover and place in the fridge for at least 1 hour to rest. It can be left overnight if preferred.

7 Take the dough out of the fridge and allow it to reach room temperature. Then gently knead it into a ball.

8 Preheat the oven to 375°F (190°C), and line a cookie sheet with parchment paper.

9 On a lightly floured surface, roll out the dough to ⅛ in (2–3 mm) thick.

10 Cut the cookies out to any shape you like, rerolling any trimmings. Then space them slightly apart on the lined cookie sheet. If decorating with crystallized ginger, push a few pieces into each cookie. Bake for 10–12 minutes.

11 Cool on the tray for 10 minutes, and then transfer the firm cookies to a cooling rack. They can be stored in an airtight container for up to 1 week.

PAELLA

Serves 6

Prep time 30 mins

Cooking time 50 mins

4 tbsp olive oil
10 oz (300 g) chicken thighs, cut into chunks
⅔ cup (150 g) diced pancetta
⅔ cup (150 g) chorizo, cut into thick slices
1 large Spanish onion, roughly chopped
1 red pepper, seeded and cut into chunks
1 green pepper, seeded and cut into chunks
1 tbsp paella mix (see p.74)
1 cup (250 g) Calasparra (Spanish short-grain) rice, or other paella or risotto rice
¾ cup (150 ml) Fino sherry, or dry white wine
3¼ cups (750 ml) hot fish or chicken stock
1 cup (200 ml) tomato paste
5 oz (150 g) prepared squid, sliced into rings
juice and zest of 1 lemon, plus extra wedges to serve
salt and freshly ground black pepper, to taste
12 clams, cleaned
6 mussels, scrubbed and with beards removed
6 cooked shrimp or whole, large, shell-on prawns
handful fresh flat-leaf parsley, roughly chopped

1 Heat 2 tbsp of the olive oil in a paella dish or heavy-based saucepan. Add the chicken, pancetta, and chorizo, and stir over medium–high heat for 8–10 minutes, until browned all over. Remove with a slotted spoon and transfer to a plate.

2 Add the remaining oil to the chorizo oil in the pan, then cook the onion and peppers over medium heat for 5–8 minutes, until softened.

3 Stir in the paella spice mix along with the rice. Stir for a minute or so, until all the grains of rice are well-coated and glossy.

4 Now add the sherry and turn up the heat, allowing the liquid to bubble and the rice to absorb it. Pour in the hot stock and the tomato paste, and reduce to a simmer for 10 minutes, stirring occasionally.

5 Return the meat to the pan, stir, and cook gently for another 10 minutes.

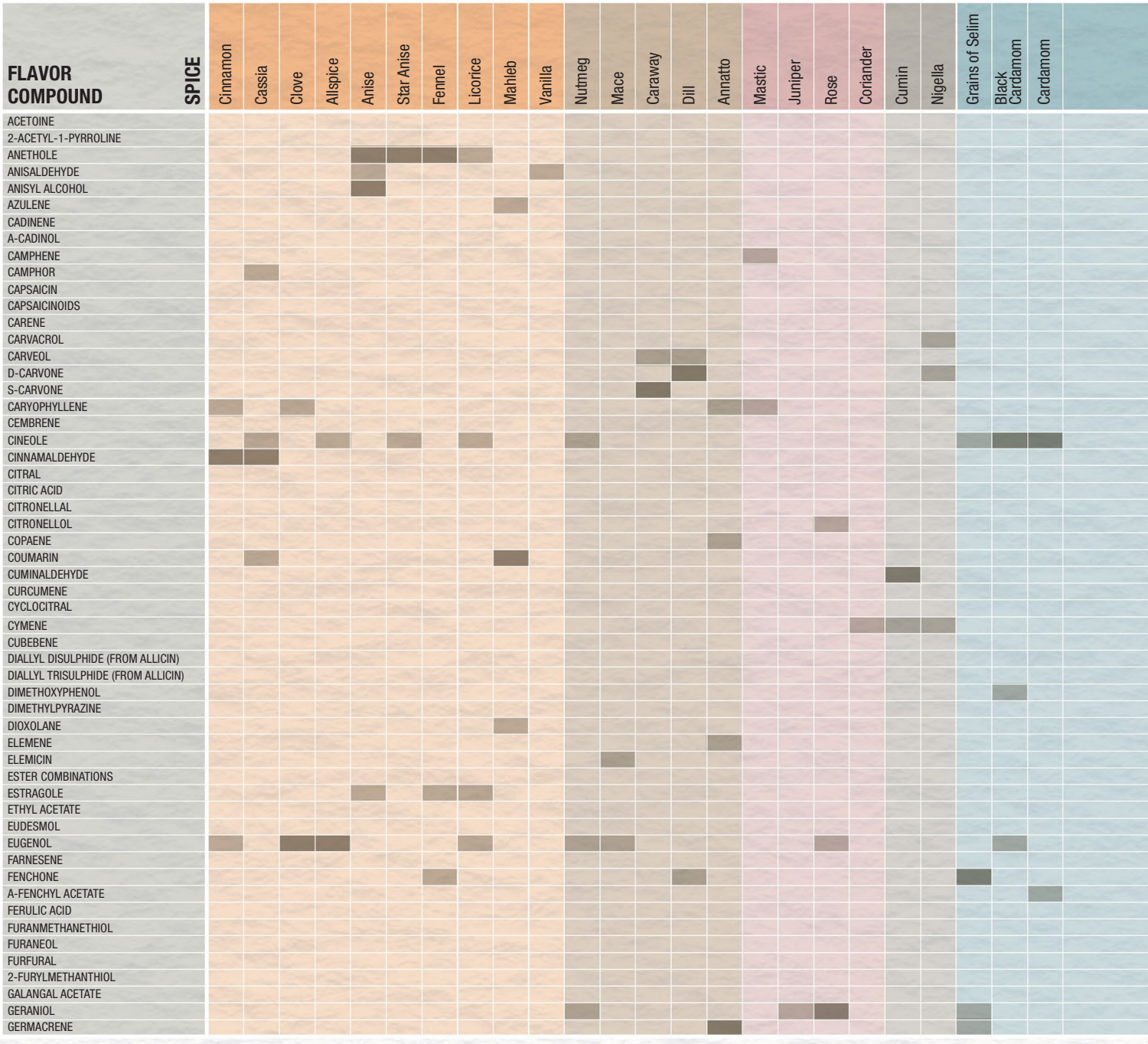
6 Now stir the squid rings into the rice, along with the lemon zest plus juice, and season to taste. Ensure that all the clams and mussels are tightly closed, then push them into the rice and cover with a lid or foil. Steam for 4–5 minutes until all the mussels and clams have opened (discard any that have not).

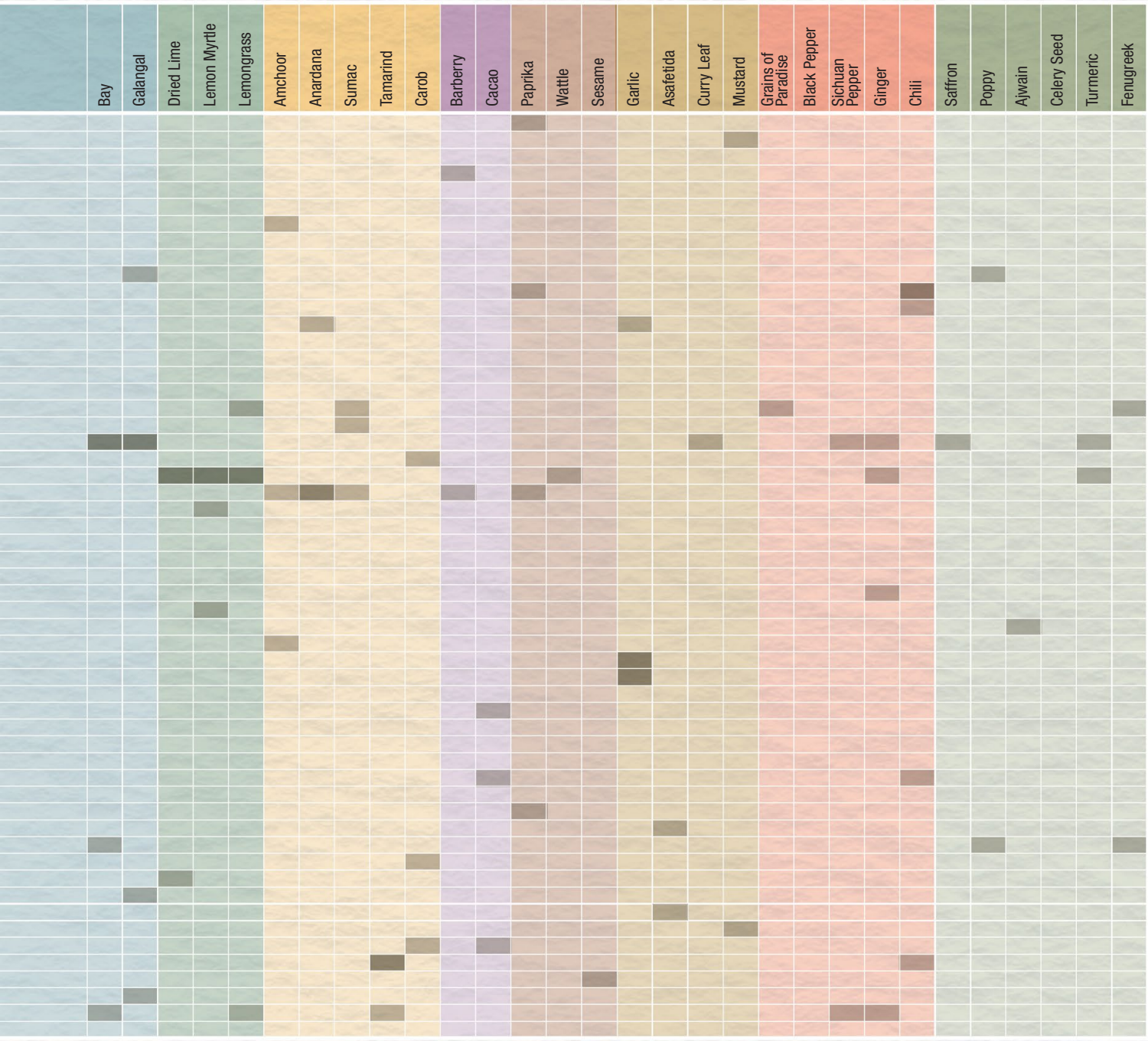
7 Now sit the shrimp on top, cover, and steam for a further 5 minutes, until everything is cooked through, the rice is tender, and most of the liquid has been absorbed. Do not stir at this point—this will help a crust to form—but keep the heat low so it does not burn.

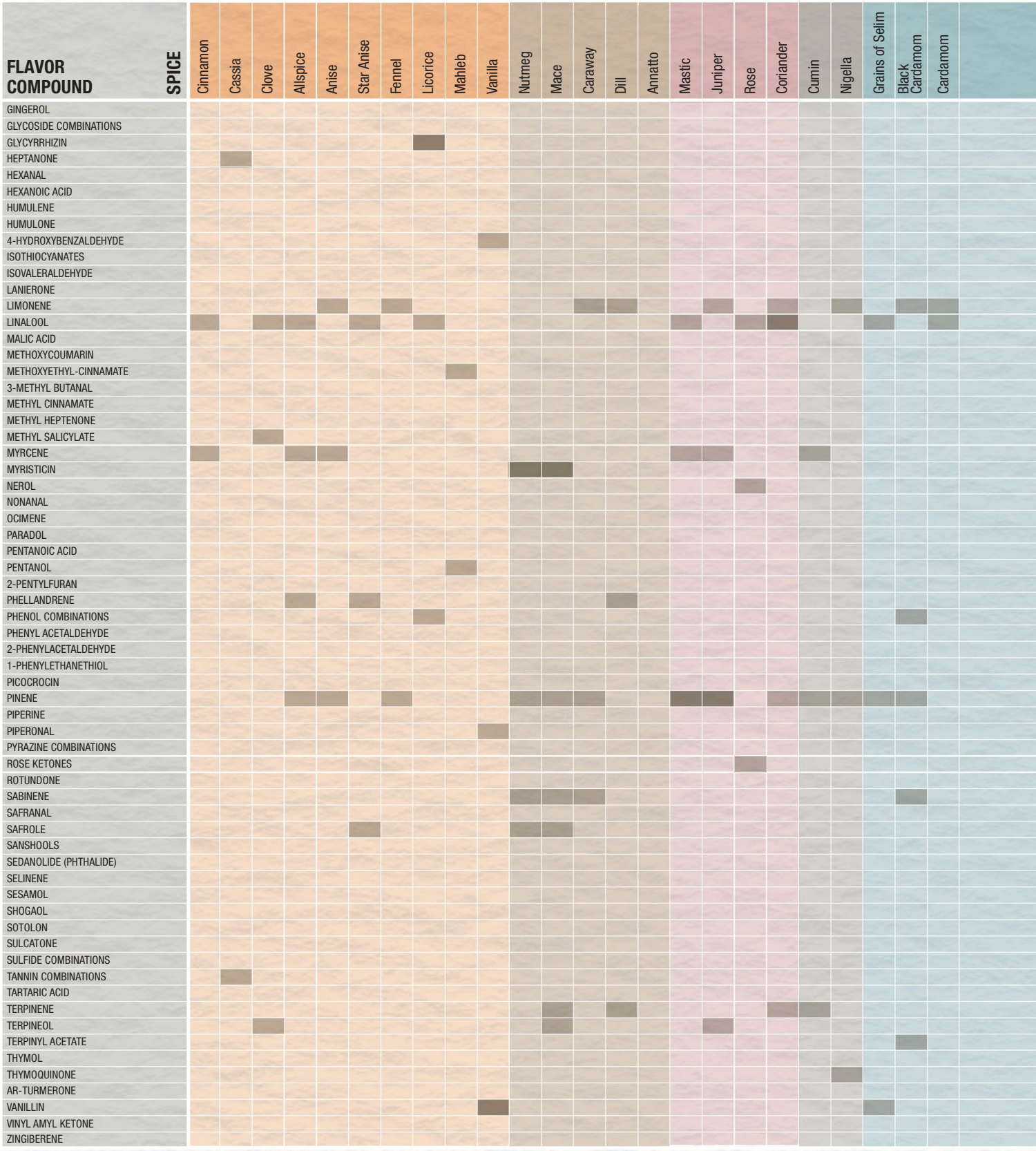
8 Sprinkle the chopped parsley over the paella and serve immediately with the extra lemon wedges on the side.

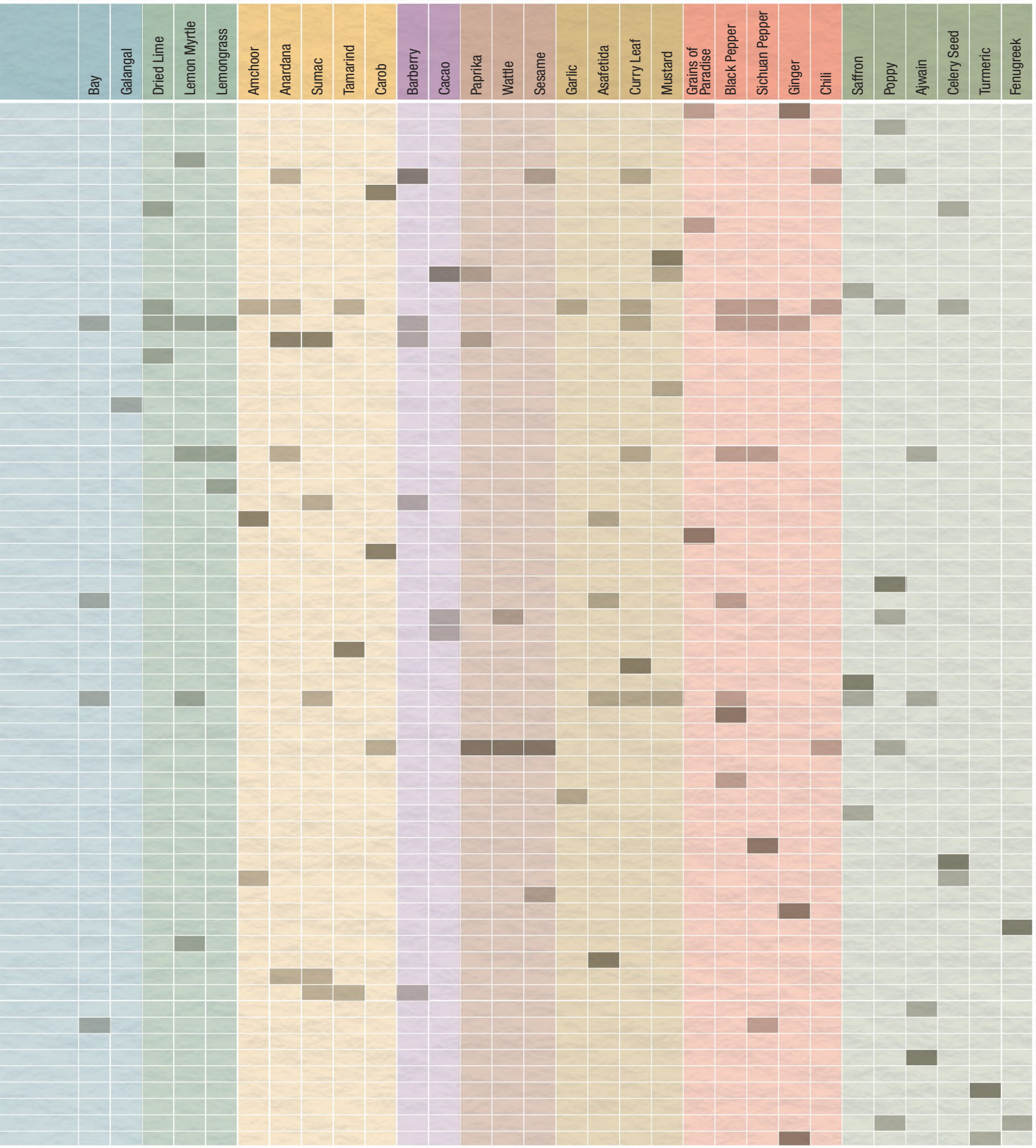
TABLE OF SPICES AND THEIR FLAVOR COMPOUNDS

This table provides an at-a-glance visual reference for identifying the principal flavor compounds of all the profiled spices, and will help you to make connections between spices through their compounds. Spices are color-coded in their flavor groups (see pp.12–15), and major and secondary compounds are highlighted by the shading of the tiles.




FLAVOR GROUPS
Sweet Warming Phenols
Warming Terpenes
Fragrant Terpenes
Earthy Terpenes
Penetrating Terpenes
Citrus Terpenes
Sweet-Sour Acids
Fruity Aldehydes
Toasty Pyrazines
Sulfurous Compounds
Pungent Compounds
Unique Compounds
TYPE OF COMPOUND
Major compound
Secondary compound
Bay
Galangal
Dried Lime
Lemon Myrtle
Lemongrass
Amchoor
Anardana
Sumac
Tamarind
Carob
Barberry
Cacao
Paprika
Wattle
Sesame
Garlic
Asafetida
Curry Leaf
Mustard
Grains of Paradise
Black Pepper
Sichuan Pepper
Ginger
Chili
Saffron
Poppy
Ajwain
Celery Seed
Turmeric
Fenugreek


FLAVOR COMPOUND
SPICE
Cinnamon
Cassia
Clove
Allspice
Anise
Star Anise
Fennel
Licorice
Mahleb
Vanilla
Nutmeg
Mace
Caraway
Dill
Annatto
Mastic
Juniper
Rose
Coriander
Cumin
Nigella
Grains of Selim
Black Cardamom
Cardamom
GINGEROL
GLYCOSIDE COMBINATIONS
GLYCYRRHIZIN
HEPTANONE
HEXANAL
HEXANOIC ACID
HUMULENE
HUMULONE
4-HYDROXYBENZALDEHYDE
ISOTHIOCYANATES
ISOVALERALDEHYDE
LANIERONE
LIMONENE
LINALOOL
MALIC ACID
METHOXYCOUMARIN
METHOXYETHYL-CINNAMATE
3-METHYL BUTANAL
METHYL CINNAMATE
METHYL HEPTENONE
METHYL SALICYLATE
MYRCENE
MYRISTICIN
NEROL
NONANAL
OCIMENE
PARADOL
PENTANOIC ACID
PENTANOL
2-PENTYLFURAN
PHELLANDRENE
PHENOL COMBINATIONS
PHENYL ACETALDEHYDE
2-PHENYLACETALDEHYDE
1-PHENYLETHANETHIOL
PICOCROCIN
PINENE
PIPERINE
PIPERONAL
PYRAZINE COMBINATIONS
ROSE KETONES
ROTUNDONE
SABINENE
SAFRANAL
SAFROLE
SANSHOOLS
SEDANOLIDE (PHTHALIDE)
SELINENE
SESAMOL
SHOGAOL
SOTOLON
SULCATONE
SULFIDE COMBINATIONS
TANNIN COMBINATIONS
TARTARIC ACID
TERPINENE
TERPINEOL
TERPINYL ACETATE
THYMOL
THYMOQUINONE
AR-TURMERONE
VANILLIN
VINYL AMYL KETONE
ZINGIBERENE


Bay
Galangal
Dried Lime
Lemon Myrtle
Lemongrass
Amchoor
Anardana
Sumac
Tamarind
Carob
Barberry
Cacao
Paprika
Wattle
Sesame
Garlic
Asafetida
Curry Leaf
Mustard
Grains of Paradise
Black Pepper
Sichuan Pepper
Ginger
Chili
Saffron
Poppy
Ajwain
Celery Seed
Turmeric
Fenugreek

Index

Page numbers in **bold** refer to main entries

A

adobo 52
  adobo marinade 53
  Spiced Filipino Adobo with Chicken and Pork 208
advieh 27
  Persian Rice Puddings 210
Afghanistan 174, 194, 200
Africa **30–37**
  Central Africa 31, **35**
  East Africa 31, **34–35**
  Horn of Africa 31, **32**
  The Maghreb 30–31, **32–33**
  Southern Africa 31, **36–37**
  West Africa 30–31, **36**
aji limo 68
ajwain 10, 15, **200–201**
  flavor compounds 201, 215, 217
aldehydes, fruity 13, 15, **160–163**
Aleppo pepper 21, *22*
Ali Baba 168
allspice 10, 14, 17, 63, **86–87**
  Arabic baharat 26
  Chicken and Eggplant Biryani with Seven-Spice 104
  flavor compounds 87, 214, 216
  Jamaican jerk rub 64
  mulling spice 73
almonds: dukkah 28
Amazon basin 63, **67**
amchoor 14, 39, 42, **148–149**
  chaat masala 42
  flavor compounds 13, 149, 215, 217
the Americas **62–69**
  Amazon basin 63, **67**
  the Andes 63, **66–67**
  the Caribbean 63, **64**
  Mexico and Central America 63, **64–65**
  North America 63, **68**
  Pacific South America 63, **68–69**
  see also individual countries
anardana 14, **150–151**, 215, 217
ancho chilis **192**
  mole mix 65
the Andes 63, **66–67**
anethole 11, 12, 17
anise 14, **88–89**
  flavor compounds 89, 214, 216
  mole mix 65
annatto 14, 47, **114–115**
  flavor compounds 12, 115, 214, 216
apples: Sweet and Spicy Apple Pastry Rosettes 182
apricots: Lamb Kofte 210
Arab traders 20
  black pepper 184
  carob 158
  cinnamon 80
  cumin 126
  dried limes 142
  ginger 188
  poppy seeds 198
  saffron 194
  tamarind 154
Arabian Peninsula 21, **29**
Arabic baharat 26
arbol chilis **192**
arrabiata sauce 76
asafetida 10, 15, **174–175**
  chaat masala 42
  flavor compounds 175, 215, 217
  gunpowder 45
Ashanti pepper: yaji 36
Ashurbanipal 160
Asian Larb Salad with Curried Duck and Khao Kua 140
Australia 144, 146, 166, 176
Aztecs
  annatto 114
  cacao 162
  chilis 190
  vanilla 100

B

baharat *22–23*, *25*, 126
  Arabic baharat 26
  Lamb Kofte 210
Bangladesh 39, **42–43**
  amchoor 148
  curry leaves 176
  galangal 138
barberries 14, 21, **160–161**
  flavor compounds 13, 161, 215, 217
bay 14, **136–137**
  adobo marinade 53
  Burmese garam masala 48
  flavor compounds 137, 215, 217
  khmeli-suneli 77
  mulling spice 73
  Nanjing spice bag 59
BBQ rub 68
beef: Durban Beef Bunny Chow 211
Bhutan 132, 186
bird's eye chilis 51, **193**
biryani: Chicken and Eggplant Biryani with Seven-Spice 104
bitter orange powder 73
  Finnish gingerbread spice 72
black beans: chili black bean sauce 61
bobimbi: mbongo mix 35
Brazil 148, 162, 184
Bulgaria 120, *122*
bulgur wheat: Lamb Kofte 210
bumbu 52
Burmese garam masala 48
butter
  niter kibbeh 32
  Spiced Scallops with Saffron Beurre Blanc 196

C

cacao 14, 63, **162–163**
  flavor compounds 163, 215, 217
  mole mix 65
Cambodia 47, **48–49**, 146, 204
Canada 178, 198
capsaicin 13, 165, 190
caraway 14, **108–109**
  flavor compounds 109, 214, 216
  harissa 33
cardamom 11, 14, **134–135**
  advieh 27
  black cardamom 14, 39, 132–133, 214, 216
  Black Sesame, Licorice, and Cardamom Ice Cream 170
  Burmese garam masala 48
  Durban Beef Bunny Chow 211
  Finnish gingerbread spice 72
  flavor compounds 12, 133, 135, 214, 216
  garam masala 40
  hawaij 29
  pilau masala 34
  Shandong spice bag 58
  Sweet and Spicy Apple Pastry Rosettes 182
  Turkish baharat 23
  vindaloo paste 44
  zhug 25
Caribbean 63, **64**
carob 14, **158–159**
  flavor compounds 13, 159, 215, 217
caryophyllene 10
cascabel chilis **192**
cassava: tucupí 67
cassia 10, 14, 55, **82–83**
  flavor compounds 83, 214, 216
  garam masala 40
  vindaloo paste 44
cayenne **193**
  BBQ rub 68
  Durban curry masala 37
  paella mix 74
  yaji 36
celery seed 10, 14, **202–203**
  celery salt 203
  flavor compounds 203, 215, 217
Central America 63, **64–65**
chaat masala 42
chana dhal: gunpowder 45
Chana Masala with Sweet Potato and Spinach 211
Charlemagne, Emperor 94
cheese: Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
chicken
  Chicken and Eggplant Biryani with Seven-Spice 104
  Goan Vindaloo 212
  Paella 213
  Spiced Filipino Adobo with Chicken and Pork 208
chickpeas: Chana Masala with Sweet Potato and Spinach 211
chilis 10, 15, 21, **190–193**
  aji limo 68
  Amazon basin 67
  the Andes 66
  arrabiata sauce 76
  baklouti chili 31
  BBQ rub 68
  bird's eye chilis 51, 193
  bumbu 52
  chili black bean sauce 61
  chimichurri 66
  Chinese Steamed Salmon with Chili and Star Anise 92
  cumari chilis 63
  dried chilis 192–193
  Durban curry masala 37
  espelette chili 70
  flavor compounds 13, 191, 215, 217
  France 74
  fresh chilis 192–193
  ground chilis 193
  gunpowder 45
  harissa 33
  khmeli-suneli 77
  leche de tigre 69
  Malaysian fish curry paste 51
  Masor Tenga Fish Curry 211
  mole mix 65
  mulato chili 63
  nuoc cham 50
  piri piri chilis 31
  shichimi-togarashi 57
  Spain and Portugal 75
  Sweet and Spicy Apple Pastry Rosettes 182
  timur ko chhop 41
  tucupí 67
  vindaloo paste 44
  zhug 25
chimichurri 66
China
  amchoor 148
  anardana 150
  anise 88
  barberries 160
  black cardamom 132
  cassia 82
  celery seed 202
  chilis 190
  cloves 84
  cumin 61, 126
  East China **58–59**
  galangal 138
  garlic 172
  ginger 55
  lemon myrtle 144
  lemongrass 146
  licorice 96
  mustard 178

North China 55, **58**
poppy seeds 198
rose 120
saffron 61, 194
sesame 168
Sichuan pepper 61, 186
Silk Road 21
South China 55, **60–61**
star anise 90
turmeric 204
West China 54, **61**
Chinese Steamed Salmon with Chili and Star Anise 92
Chios 71, 116
chipotle powder **193**
Jamaican jerk rub 64
chorizo: Paella 213
cineole 10, 12, 17
cinnamon 10, 14, 39, **80–81**
advieh 27
Arabic baharat 26
Burmese garam masala 48
Chicken and Eggplant Biryani with Seven-Spice 104
Durban Beef Bunny Chow 211
Durban curry masala 37
Finnish gingerbread spice 72
five-spice powder 60
flavor compounds 81, 214, 216
Jamaican jerk rub 64
mole mix 65
mulling spice 73
pilau masala 34
Shandong spice bag 58
Sweet and Spicy Apple Pastry Rosettes 182
Turkish baharat 23
citrus terpenes 12, 15, **142–147**
Cleopatra 194
cloves 14, 31, **84–85**
Arabic baharat 26
bumbu 52
Burmese garam masala 48
Chicken and Eggplant Biryani with Seven-Spice 104
Durban curry masala 37
East Africa 35
Finnish gingerbread spice 72
five-spice powder 60
flavor compounds 11, 12, 85, 214, 216
garam masala 40
Jamaican jerk rub 64
mole mix 65
mulling spice 73
Nanjing spice bag 59
paella mix 74
pilau masala 34
quatre épices 74
Shandong spice bag 58
Sweet and Spicy Apple Pastry Rosettes 182
Turkish baharat 23
vindaloo paste 44
coconut: gunpowder 45
coconut vinegar: adobo marinade 53
Columbus, Christopher 63, 86, 164, 190
condensed milk: Black Sesame, Licorice, and Cardamom Ice Cream 170
coriander 14, 17, **122–123**
Arabic baharat 26
bumbu 52
Burmese garam masala 48
chaat masala 42
Chicken and Eggplant Biryani with Seven-Spice 104
dukkah 28
Durban curry masala 37
flavor compounds 12, 123, 214, 216
harissa 33
hawaij 29
khmeli-suneli 77
leche de tigre 69
Malaysian fish curry paste 51
taklia 25
Turkish baharat 23
zhug 25
Cortés, Hernán 100, 190
cream
Black Sesame, Licorice, and Cardamom Ice Cream 170
Persian Rice Puddings 210
Culpeper, Nicholas 136
cumin 11, 14, 20, 28, **126–127**
advieh 27
Arabic baharat 26
BBQ rub 68
black cumin 41
Burmese garam masala 48
chaat masala 42
dukkah 28
Durban curry masala 37
flavor compounds 12, 127, 214, 216
garam masala 40
harissa 33
hawaij 29
Malaysian fish curry paste 51
mole mix 65
niter kibbeh 32
paella mix 74
panch phoran 43
pilau masala 34
Shandong spice bag 58
Turkish baharat 23
vindaloo paste 44
za'atar 22
zhug 25
curcumin, cooking with 205
curdling, citrus fruit and 145
curry
Asian Larb Salad with Curried Duck and Khao Kua 140
Chana Masala with Sweet Potato and Spinach 211
Chicken and Eggplant Biryani with Seven-Spice 104
Durban Beef Bunny Chow 211
Goan Vindaloo 212
Masor Tenga Fish Curry 211
West African Peanut Curry with Durban Masala 124
curry leaves 15, **176–177**
Durban Beef Bunny Chow 211
flavor compounds 177, 215, 217
gunpowder 45

D

Date and Tamarind Granita with Caramelized Pineapple 156
dill 10, 14, **110–111**
dill pickles 111
Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
flavor compounds 111, 214, 216
Dioscorides 206
duck
Asian Larb Salad with Curried Duck and Khao Kua 140
Nanjing Salted Duck 212
dukkah 28
Durban 36, 37
Durban Beef Bunny Chow 211
Durban curry masala 37
West African Peanut Curry with Durban Masala 124

E

earthy terpenes 12, 15, **126–129**
East Asia **54–61**
East China **58–59**
Japan 55
North China 55, **58**
South China 55, **60–61**
South Korea 55, **56–57**
West China 54, **61**
Ecuador 63, 162
eggplants: Chicken and Eggplant Biryani with Seven-Spice 104
eggs: Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
Egypt **28**
ajwain 200
anardana 150
anise 88
caraway 108
celery seed 202
chilis 190
cinnamon 80, 82
coriander 28, 122
cumin 20, 28, 126
dill 110
dried limes 142
fenugreek 206
galangal 138
garlic 172
nigella 128
sesame 168
Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
Escoffier, Georges 164
espelette **193**
Ethiopia
chilis 32, 190
fenugreek 32
grains of Selim 130
korarima 31, 32
eugenol 11, 12, 17
Europe **70–77**
France 70–71, **74**
Great Britain 70, **73**
Italy 71, **76–77**
Scandinavia 71, **72–73**
Southeast Europe 71, **77**
Spain and Portugal 70, **74–75**

F

fennel 14, 39, **94–95**
Durban Beef Bunny Chow 211
five-spice powder 60
flavor compounds 12, 95, 214, 216
Malaysian fish curry paste 51
panch phoran 43
fenugreek 11, 15, **206–207**
blue fenugreek 71
Durban curry masala 37
flavor compounds 207, 215, 217
khmeli-suneli 77
niter kibbeh 32
panch phoran 43
vindaloo paste 44
feta cheese: Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
Filipino Adobo with Chicken and Pork 208
Finland 108
Finnish gingerbread spice 72
Piparkakut 213
fish
Chinese Steamed Salmon with Chili and Star Anise 92
Malaysian fish curry paste 51
Masor Tenga Fish Curry 211
five-spice powder 60, 91
Prawn and Vegetable Stir-Fry 213
flavor compounds 10–11, **12–13**
vs spice **214–217**
flavor groups 12–15
flowers 11
fragrant terpenes 12, 15, **116–125**
France 70–71, **74**
anise 88
celery seed 202
licorice 96
poppy seeds 198
fruits 10
fruity aldehydes 13, 15, **160–163**

G

galangal 10, 47, **138–139**
bumbu 52
flavor compounds 13, 14, 17, 139, 215, 217
khao kua 49
Malaysian fish curry paste 51
Galen 128, 172
Gama, Vasco de 184
Ganesh 148
garam masala 40, 91, 126
Asian Larb Salad with Curried Duck and Khao Kua 140
Burmese garam masala 48
Chana Masala with Sweet Potato and Spinach 211
garlic 25, 63, **172–173**
Georgia 71, 77, 126
Gerard, John 160
Ghana 130, 162, 180
ginger 10, 15, 55, **188–189**

advieh 27
chaat masala 42
Chicken and Eggplant Biryani with Seven-Spice 104
chili black bean sauce 61
Durban Beef Bunny Chow 211
Durban curry masala 37
Finnish gingerbread spice 72
flavor compounds 189, 215, 217
Goan Vindaloo 212
Jamaican jerk rub 64
leche de tigre 69
Nanjing Salted Duck 212
niter kibbeh 32
quatre épices 74
Sweet and Spicy Apple Pastry Rosettes 182
yaji 36
Goan Vindaloo 212
gochugaru: yangnyeomjang 56
grains of paradise 30, 35, **180–181**
flavor compounds 15, 181, 215, 217
mbongo mix 35
Sweet and Spicy Apple Pastry Rosettes 182
grains of Selim 14, 30, **130–131**
flavor compounds 12, 131, 214, 216
yaji 36
granita: Date and Tamarind Granita with Caramelized Pineapple 156
Great Britain 70, **73**
mace 73, 106
nutmeg 73, 102
rose 120
saffron 73, 194
turmeric 204
Greece 71, 77
asafetida 174
bay 136
cardamom 134
carob 158
celery seed 202
coriander 122
cumin 126
dill 110
fennel 94
galangal 138
ginger 188
licorice 96
mastic 116
mustard 178
nigella 128
saffron 194
Grenada 102, 106
guajillo chilis **192**
Guatemala 86, 134
gunpowder 45

H

habanero chilis **193**
Hanshan 186
harissa 31, 33, 109
black lime harissa 112
hazelnuts: dukkah 28
hemp seeds: shichimi-togarashi 57
hibiscus flowers 24
Hildegard of Bingen 138
Himalayan belt 39, **41**, 178
Hinduism 148, 204
Hungary 71, 77, 108, 164

I

ice cream: Black Sesame, Licorice, and Cardamom Ice Cream 170
India
ajwain 42, 200
amchoor 42, 148
anardana 150
anise 88
annatto 114
asafetida 174
black pepper 184
cardamom 39, 134
celery seed 202
Central India 39, **42**
cloves 84
coriander 122
cumin 126
curry leaves 44, 176
dill 110
East India 39, **42–43**
fennel 94
fenugreek 44, 206
galangal 138
garlic 172
ginger 188
lemongrass 146
licorice 96
mustard 178
North India 39, **40–41**
poppy seeds 198
rose 120
saffron 194
sesame 44, 168
South India 39, **45**
star anise 45, 90
tamarind 154
turmeric 204
vanilla 100, 101
West India 39, **44–45**
Indonesia 47, **52**
amchoor 148
black pepper 46, 184
cacao 162
chilis 190
cinnamon 80
cloves 84
galangal 138
lemongrass 146
nutmeg 102
turmeric 204
vanilla 100
Iran **26–27**
ajwain 200
asafetida 174
barberries 21, 160
cumin 126
dried limes 142
mahleb 98
poppy seeds 198
rose 120
saffron 21, 26, 27, 194
sumac 152
Iraq **26**
dried limes 142
fenugreek 206
pomegranates 21
poppy seeds 198
Israel 21, **24–25**, 142
Italy 71, **76–77**
carob 158
celery seed 202
juniper 118
licorice 76, 96

J

jalapeño chilis **192**
Jamaica 63, 86, 188
Jamaican jerk rub 64
Japan 55, **57**
anise 88
fennel 94
juniper 118
star anise 57, 90
Java 47, 138
John the Baptist, St. 158
juniper 14, 71, **118–119**
flavor compounds 12, 119, 214, 216

K

kala namak: chaat masala 42
Kashmir 174, 194
kashmiri chilis **192**
khao kua 49
Asian Larb Salad with Curried Duck and Khao Kua 140
khmeli-suneli 77
kokum 45
König, Johann Gerhard 176
korarima 31
niter kibbeh 32
kuli-kuli: yaji 36

L

Lamb Kofte 210
Laos 46, **48–49**
lemongrass 146
star anise 90
larb: Asian Larb Salad with Curried Duck and Khao Kua 140
Lebanon **25**
leche de tigre 69
lemon myrtle 14, **144–145**
flavor compounds 12, 145, 215, 217
lemongrass 10, 14, 47, **146–147**
flavor compounds 12, 147, 215, 217
khao kua 49
Lepcha community 132
licorice 10, 14, 55, **96–97**
Black Sesame, Licorice, and Cardamom Ice Cream 170
flavor compounds 97, 214, 216
Nanjing spice bag 59
Shandong spice bag 58
limes
black limes 21
black lime harissa 112
dried lime 14, **142–143**, 215, 217
khao kua 49
makrut lime 46
linalool 12, 17
lotus seeds 58

M

mace 14, **106–107**
flavor compounds 12, 107, 214, 216
garam masala 40
Madagascar
cloves 32, 84
tamarind 154
vanilla 31, 100, 101
The Maghreb 30–31, **32–33**
mahleb 14, **98–99**
flavor compounds 99, 214, 216
makrut lime 46
khao kua 49
Malaysia 46–47, **51**
black pepper 184
curry leaves 176
lemon myrtle 144
lemongrass 146
Malaysian fish curry paste 51
turmeric 204
Maluku (Moluccas) Islands 47, 84, 102, 106
mangoes 148–149
marigold: khmeli-suneli 77
marjoram: khmeli-suneli 77
Masor Tenga Fish Curry 211
mastic 10, 71, **116–117**
flavor compounds 14, 117, 214, 216
Maya 86, 114, 162
mbongo mix 35
Mexico 63, **64–65**
allspice 86
amchoor 148
bay 136
cacao 162
chilis 65, 190, 192–193
cumin 126
ginger 188
vanilla 100, 101
Middle East **20–29**
Arabian Peninsula **29**
Egypt 20, **28**
Iran 21, **26–27**
Iraq **26**
Israel 21, **24–25**
Lebanon **25**
Syria 21, **22**
Turkey 20, **22–23**
milk
Persian Rice Puddings 210
mole mix 65
molle 63, 67
Morocco
carob 158
cumin 126
rose 120
saffron 33, 194
mulato chilis **193**
mulling spice 73
Murray, Johann Andreas 176
mustard 11, 39, **178–179**
flavor compounds 13, 15, 179, 215, 217
Masor Tenga Fish Curry 211
panch phoran 43
vindaloo paste 44
Myanmar 46, **48**
amchoor 148

cinnamon 80
curry leaves 176
tamarind 46

N

Nanjing spice bag 59
Nanjing Salted Duck 212
Nepal 132, 186
Nero, Emperor 150
The Netherlands
caraway 108
juniper 118
nutmeg 102
paprika 164
poppy seeds 198
nigella 14, **128–129**
flavor compounds 12, 129, 214, 216
panch phoran 43
niter kibbeh 32
njangsa: mbongo mix 35
noodles
Prawn and Vegetable Stir-Fry 213
Prawn Summer Rolls 212
North America 63, **68**
see also individual countries
nuoc cham 50
nutmeg 11, **102–103**, 106, 107
Arabic baharat 26
bumbu 52
calabash nutmeg 31
Chicken and Eggplant Biryani with Seven-Spice 104
flavor compounds 12, 14, 103, 214, 216
garam masala 40
Jamaican jerk rub 64
mbongo mix 35
mulling spice 73
quatre épices 74
Turkish baharat 23

O

Olmec people 162
Oman 29, 142
omelette: Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112
orange peel: shichimi-togarashi 57
oregano 129, 201
chimichurri 66
Mexican oregano 64
za'atar 22

P

Pacific South America 63, **68–69**
see also individual countries
Paella 213
paella mix 74
Pakistan 84, 148, 200
pancetta
arrabiata sauce 76
Paella 213
panch phoran 42–43, 126
Masor Tenga Fish Curry 211
pandan leaves 48
paprika 15, 63, **164–165**
chimichurri 66
flavor compounds 165, 215, 217
Hungarian paprika 71, 77, 164
Jamaican jerk rub 64
parsley
chimichurri 66
zhug 25
pasilla chilis 193
pastries: Sweet and Spicy Apple Pastry Rosettes 182
peanuts
mbongo mix 35
West African Peanut Curry with Durban Masala 124
pectin 161
penetrating terpenes 12, 15, **130–141**
peppercorns
adobo marinade 53
Arabic baharat 26
BBQ rub 68
black pepper 10, 15, 46, 130, **184–185**, 215, 217
bumbu 52
Burmese garam masala 48
chaat masala 42
Chicken and Eggplant Biryani with Seven-Spice 104
five-spice powder 60
flavor compounds 13, 185, 215, 217
garam masala 40
grains of paradise as substitute 181
hawaij 29
Jamaican jerk rub 64
Kerala 38
khmeli-suneli 77
Malaysian fish curry paste 51
mole mix 65
Nanjing Salted Duck 212
paella mix 74
pilau masala 34
quatre épices 74
sanshō 187
Shandong spice bag 58
shichimi-togarashi 57
Sichuan pepper 15, 55, 61, **186–187**, 215, 217
Turkish baharat 23
Venice trade 71
vindaloo paste 44
peppers, Capsicum 164–165
perilla seeds 55, 57
periodic table of spices 14–15
Persia
asafetida 174
cassia 82
dried limes 142
Persian Rice Puddings 210
rose 120
turmeric 204
Peru 162, 188
Petronius 198
peverino 77
phenols, sweet warming 12, **80–101**
Philippines 47, **52–53**
amchoor 148
annatto 47, 53, 114
star anise 90
turmeric 204
pilau masala 34
pimentón: paella mix 74
Pineapple: Date and Tamarind Granita with Caramelized Pineapple 156
Piparkakut 213
piperine 10, 13
piri piri chilis 31, 193
Pliny the Elder 126, 152
Plutarch 138
Poivre, Pierre 84
pomegranates 21, 150–151
poppy seeds 15, **198–199**
flavor compounds 199, 215, 217
pork: Spiced Filipino Adobo with Chicken and Pork 208
Portugal 38, 70, 74–75, 158
prawns
Prawn and Vegetable Stir-Fry 213
Prawn Summer Rolls 212
Puerto Rico 154
pungent compounds 13, 15, **180–193**
pyrazines, toasty 13, 15, **164–171**

Q

quatre épices 74

R

Réunion 100, 101
rhizomes 10
rice
Chicken and Eggplant Biryani with Seven-Spice 104
khao kua 49
Paella 213
Persian rice puddings 210
Romania 108, 190
Romans 20
ajwain 200
anardana 150
anise 88
asafetida 174
bay 136
caraway 108
cardamom 134
celery seed 202
cloves 84
coriander 122
cumin 126
fennel 94
fenugreek 206
galangal 138
garlic 172
ginger 188
licorice 96
mastic 116
mustard 178
nigella 128
poppy seeds 198
rose 120
saffron 194
sesame 168
sumac 152
roots 10
rose 14, 21, **120–121**
advieh 27
flavor compounds 121, 214, 216
Russell, John 82
Russia
allspice 86
coriander 122
garlic 172
juniper 118
licorice 96

S

saffron 11, 33, 75, **194–195**
flavor compounds 13, 15, 215, 217
Iran 21, 26
paella mix 74
Persian Rice Puddings 210
Spiced Scallops with Saffron Beurre Blanc 196
salad: Asian Larb Salad with Curried Duck and Khao Kua 140
salmon: Chinese Steamed Salmon with Chili and Star Anise 92
sansho 187
shichimi-togarashi 57
savory: khmeli-suneli 77
scallops: Spiced Scallops with Saffron Beurre Blanc 196
Scandinavia 71, **72–73**
Scotch bonnet **193**
Scoville, William 190
Scoville Heat Index 190
seafood: Paella 213
seeds 11
sesame 15, 55, **168–169**
Black Sesame, Licorice, and Cardamom Ice Cream 170
dukkah 28
flavor compounds 169, 215, 217
gunpowder 45
mole mix 65
shichimi-togarashi 57
yangnyeomjang 56
za'atar 22
shajiang 61
Shandong cuisine 58
Shandong spice bag 58
shichimi-togarashi 57
Sichuan pepper 15, 55, 61, **186–187**
five-spice powder 60
flavor compounds 187, 215, 217
Nanjing Salted Duck 212
Shandong spice bag 58
Sikkim 132
Silk Road
Africa 31
Calcutta 39
China 21, 61, 96
East Asia 54–55
Europe 71
Iraq 26
poppy seeds 198
Singapore 46–47, **51**
South Asia **38–45**
Central India 39, **42**
East India and Bangladesh 39, **42–43**
Himalayan Belt 39, **41**
North India 39, **40–41**
South India and Sri Lanka 39, **45**

West India 39, **44–45**
South Korea 55, **56–57**
garlic 172
Sichuan pepper 186
Southeast Asia **46–53**
Indonesia 47, **52**
Malaysia and Singapore 46–47, **51**
Myanmar 46, **48**
Philippines 47, **52–53**
Thailand, Laos, and Cambodia 46–7, **48–49**
Vietnam 47, **50–51**
soy sauce: adobo marinade 53
Spain 70, **74–75**
carob 75, 158
chilis 190
licorice 96
paprika 164
saffron 75, 194
spice
definition of **10–11**
periodic table of spices **14–15**
vs flavor compounds **214–217**
spice blends **16–17**
adobo marinade 53
advieh 27
Arabic baharat 26
arrabiata sauce 76
baharat 22–23
BBQ rub 68
bumbu 52
Burmese garam masala 48
chaat masala 42
chili black bean sauce 61
chimichurri 66
dukkah 28
Durban curry masala 37
Finnish gingerbread spice 72
five-spice powder 60
garam masala 40
gunpowder 45
harissa 33
hawaij 29
Jamaican jerk rub 64
khao kua 49
khmeli-suneli 77
leche de tigre 69
Malaysian fish curry paste 51
mbongo mix 35
mole mix 65
mulling spice 73
Nanjing spice bag 59
niter kibbeh 32
nuoc cham 50
paella mix 74
panch phoran 42–43
pilau masala 34
quatre épices 74
Shandong spice bag 58
shichimi-togarashi 57
taklia 25
timur ko chhop 41
tucupí 67
vindaloo paste 44
yaji 36
yangnyeomjang 56
za'atar 22
zhug 24, 25
Spice Islands 47, 84
Spice Route 26, 31, 39, 204
spice wars 47
spinach: Chana Masala with Sweet Potato and Spinach 211
split urad dhal: gunpowder 45
Sri Lanka 39, **45**
annatto 114
cardamom 134
cinnamon 39, 45, 80
cloves 84
curry leaves 176
lemongrass 146
mace 106
nutmeg 102
vanilla 100, 101
star anise 11, 14, 17, **90–91**
Burmese garam masala 48
Chinese Steamed Salmon with Chili and Star Anise 92
five-spice powder 60
flavor compounds 91, 214, 216
Nanjing spice bag 59
Shandong spice bag 58
stems 10
stir-fry: Prawn and Vegetable Stir-Fry 213
sulfurous compounds 13, 15, **172–179**
sumac 10, 14, 20, **152–153**
flavor compounds 13, 153, 215, 217
za'atar 22
summer rolls: Prawn Summer Rolls 212
sweet potatoes: Chana Masala with Sweet Potato and Spinach 211
sweet-sour acids 13, 15, **148–159**
sweet warming phenols 12, 15, **80–101**
Syria **22**
chilis 21
cumin 126
fenugreek 206
mahleb 98
sumac 152

T

Tahiti 100, 101
taklia 25
tamarind 14, 46, **154–155**
Date and Tamarind Granita with Caramelized Pineapple 156
flavor compounds 155, 215, 217
gunpowder 45
Tanzania 34, 130, 134
terpenes 12
citrus terpenes 12, 15, **142–147**
earthy terpenes 12, 15, **126–129**
fragrant terpenes 12, 15, **116–125**
penetrating terpenes 12, 15, **130–141**
warming terpenes 12, 15, **102–115**
Thailand 46–47, **48–49**
amchoor 148
lemongrass 146
makrut lime 46
tamarind 154
turmeric 204
Theophrastus 154
thyme 201
timur 187
timur ko chhop 41
toasty pyrazines 13, 15, **164–171**
tomatoes
arrabiata sauce 76
Chana Masala with Sweet Potato and Spinach 211
Durban Beef Bunny Chow 211
Goan Vindaloo 212
Masor Tenga Fish Curry 211
Totonac people 100
tucupí 67
Turkey **22–23**
asafetida 174
bay 136
carob 158
chilis 190
cumin 126
dried limes 142
fennel 94
licorice 96
mahleb 98
nigella 128
paprika 23, 164
poppy seeds 198
rose 120
sumac 20, 152
turmeric 10, 15, **204–205**
bumbu 52
flavor compounds 13, 205, 215, 217
hawaij 29
Malaysian fish curry paste 51
Masor Tenga Fish Curry 211
niter kibbeh 32
turpan 54
Tutankhamen 206

U

unique compounds 13, 15, **194–209**
United States of America
chilis 190
dill 110
fennel 94
garlic 172
pepper 63
vanilla 63

V

vanilla 10, 14, 31, **100–101**
flavor compounds 101, 214, 216
vegetables
Prawn and Vegetable Stir-Fry 213
West African Peanut Curry with Durban Masala 124
Venice 71, 76, 77, 84
Vietnam 47, **50–51**
black pepper 50, 184
cassia 82
cinnamon 80
lemongrass 47, 146
star anise 90
vindaloo paste 44
Goan Vindaloo 212

W

warming terpenes 12, 15, **102–115**
wattle 15, **166–167**, 215, 217
West African Peanut Curry with Durban Masala 124

Y

yangnyeomjang 56
yogurt: Black Sesame, Licorice, and Cardamom Ice Cream 170

Z

za'atar 22
Zanzibar 31, 35, 84
zhug 24, 25
zucchini: Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa 112

About the Authors

DR. STUART FARRIMOND

Specializing in food science, Dr. Stuart Farrimond is a science and health writer, presenter, and communicator. He makes regular appearances on TV, radio, and at public events. He is a trained medical doctor and teacher, and his writing appears in the national and international press, including *New Scientist*, *The Independent*, the *Daily Mail*, and *The Washington Post*. Dr. Stuart presents a weekly radio science show, and his widely publicized food research has addressed a broad range of topics. He is the author of DK's *The Science of Cooking*.

Stuart oversaw all scientific aspects of the project, and wrote the Spice Science chapter and all science-based content in the Spice Profiles chapter, including information on blending science and getting the most flavor from spices.

Laura Nickoll is a writer and food editor based in Kent. She is a member of the Guild of Food Writers and specializes in food and eating out for online and print restaurant guides. She also edits cookbooks and has worked with many influential food writers and chefs, including Mary Berry, Rachel Allen, Ed Smith, Marcus Wareing, Signe Johansen, and Rosie Birkett.

Laura wrote all the non-science content of the Spice Profiles chapter.

Jan Fullwood is a home economist who believes she has the perfect job. Her varied career involves working for major food brands; magazines including *Good Housekeeping* and *delicious*; and books, notably for Mary Berry. Jan is constantly creating, evaluating, and eating food, and always learning something new; she lives with an overstuffed larder and her well-fed family in Hertfordshire.

Jan wrote the World of Spice Further Recipes.

Roopa Gulati is a chef, food writer, and broadcaster, who worked in India for two decades before returning to London in 2001. As a Consultant Chef to the Taj hotel group, she honed her expertise in regional cooking styles across South Asia. Back in the UK, she was deputy editor for UKTV's Good Food Channel, and is now a freelancer, writing editorial features, recipes, and restaurant reviews for leading food brands and magazines such as *BBC Good Food*, *Time Out*, and *delicious*. Assignments include cooking demonstrations at London's Borough Market, scoping Rick Stein's BBC series in India, and joining the judge's panel for BBC Radio 4's Food and Farming Awards.

Roopa wrote on South Asia in the World of Spice chapter, as well as the recipes for Date and Tamarind Granita with Caramelized Pineapple and Spiced Scallops with Saffron Beurre Blanc.

Thomas Howells is a London-based journalist. He works as a freelance food editor and writer for *Time Out London*, and has written for *The Guardian*, the *Financial Times*, and *Wallpaper**.

Tom wrote on Europe in the World of Spice chapter.

Anna Kibbey is a food and drink writer and cofounder of food copywriting agency 2Forks.co.uk. As a journalist and editor at Square Meal, she reviewed restaurants for many years, and writes food features, recipes, and reviews for *Time Out*, *Food & Travel*, *Men's Health*, and *Mr & Mrs Smith*. Anna is an eager cook, consumer, and student of Middle Eastern food, particularly Lebanese and Persian cuisine, and the owner of an encyclopedic—and ever-expanding—collection of spices. She most often reaches for cumin, coriander seeds, cinnamon, and (always) chili flakes.

Anna wrote on the Middle East in the World of Spice chapter, as well as the recipes for Chicken and Eggplant Biryani with Seven-Spice and Ejjeh with Zucchini, Feta, and Dill and Black Lime Harissa.

Sorrel Moseley-Williams is a British freelance journalist and sommelier who has been based in Argentina since 2006. She focuses on Latin American food, travel, and wine, and can be found on the pages of *Wine Enthusiast*, *Monocle*, *Condé Nast Traveller*, *Travel + Leisure*, *Decanter*, and *Lugares* in Spanish, among other publications; she translated the Mirazur, Tegui, and La Cabrera books. She co-runs the pop-up wine bar "Come Wine With Us" in Buenos Aires and can be found on Instagram as @sorrelita.

Sorrel wrote on the Americas in the World of Spice chapter.

Freda Muyambo is a food writer with expertise in African cuisine and a passion for sharing African culture through food. She often describes herself as having a pan-African palate; born and raised in Botswana to Ghanaian parents, she currently lives in Nigeria, and has traveled extensively across the continent.

Freda resides in the Nigerian city of Lagos where she is acquiring primary knowledge in the use of local spices, from fermented locust beans to a vast array of chilis, pipers, and cubebs.

Freda wrote on Africa in the World of Spice chapter, as well as the recipes for West African Peanut Curry with Durban Masala and Sweet and Spicy Apple Pastry Rosettes.

Annica Wainwright is a food and drink writer and cofounder of food copywriting agency 2Forks.co.uk. She has traveled extensively in Southeast Asia and is a self-confessed Thai food geek. Her favorite spices are garlic, ginger, star anise, and the highly addictive endorphin-producer known as the red hot chili pepper. Annica never leaves home without sriracha sauce (she's got a mini bottle attached to her key chain) and will forever be grateful to the Portuguese traders who brought us the hot stuff.

Annica wrote on Southeast Asia in the World of Spice chapter, as well as the recipes for Asian Larb Salad with Curried Duck and Khao Kua, and Spiced Filipino Adobo with Chicken and Pork.

Yolanda Zappaterra is a food, travel, and design writer. Born to Italian parents in South Wales, Yolanda's early introduction to "spicy" cooking was Vesta curries, her mother's misguided attempts to anglicize the repertoire of Neapolitan cuisine that she had brought with her, as a way of fitting in. None of this deterred Yolanda's palate or food-writing ambitions, and she has since worked as a food writer and editor for *Time Out*, *Lonely Planet*, and *The Independent*, among many others. Her home cooking has broadened out from the regional Italian dishes she learned in her mother's kitchen to include her in-laws' Chinese and Caribbean dishes, so dinner at her house could be a multi-layered *parmigiana*, a spicy *mapo tofu*, or Trinidad doubles.

Yolanda wrote on East Asia in the World of Spice chapter, as well as the recipes for Chinese Steamed Salmon with Chili and Star Anise and Black Sesame, Licorice, and Cardamom Ice Cream.

Acknowledgments

FROM THE AUTHORS

Dr. Stuart Farrimond

Cataloging the flavorful science behind our diverse world of spices is quite an undertaking. I am indebted to family and friends for their understanding and tolerance of the many days I have spent in the writer's "cave," surrounded by boxes, bags, and tubs of spices. My wife, Grace, been steadfastly supportive throughout this ambitious project; even enduring the (mis)fortune of being subject to a barrage of spice blending experiments. As she was to discover, culinary scientific endeavors are fraught with taste bud peril!

As with last year's publication, *The Science of Cooking*, I am once again awed by the talents of DK's designers, artists, and photographers, who have woven their magic to help bring the science of spices to life so beautifully. Thanks go to Dawn Henderson and Mary-Clare Jerram for inviting me back to crack open this truly tasty topic, and to editor Alastair Laing who slaved over a hot computer to bring all the ingredients of this book together harmoniously. My literary agent Jonathan Pegg has also been a dependable support, for which I am hugely grateful. A final word of thanks goes to Winston, our Patterdale terrier, whose insatiable appetite for long walks has helped keep body and mind healthy throughout.

Sorrel Moseley-Williams would like to thank Anthony Vásquez of La Mar Buenos Aires, Leonor Espinosa of LEO in Bogotá, Virgilio Martínez of Central in Lima and Mil in Moray, Jaime Rodríguez Camacho of Proyecto Caribe in Cartagena de Indias, Pedro Miguel Schiaffino of ámaZ in Lima, and Tom Le Mesurier of Eat Rio in Rio de Janeiro.

FROM THE PUBLISHER

We would like to acknowledge the help of the following in the production of this book: special thanks to Rona Skene and Megan Lea for stepping in and working well beyond the call of duty; thanks to Jo Hargreaves and Jane Simmonds for copy editing, Jan Fullwood for recipe testing, and Vanessa Bird for indexing. We would also like to thank Sean @ kja-artists for artworks on pages 12, 13, 20, 21, 30, 31, 38, 39, 46, 47, 54, 55, 62, 63, 70, 71, 82, 102, 110, 116, 142, 144, 164, 174, 184, and 206.
DK Delhi would like to thank Anukriti Arora for design assistance.